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CONTINUATION OF THE
BULLETIN OF THE NUTTALL ORNITHOLOGICAL CLUB

New
Series,
Vol. LII

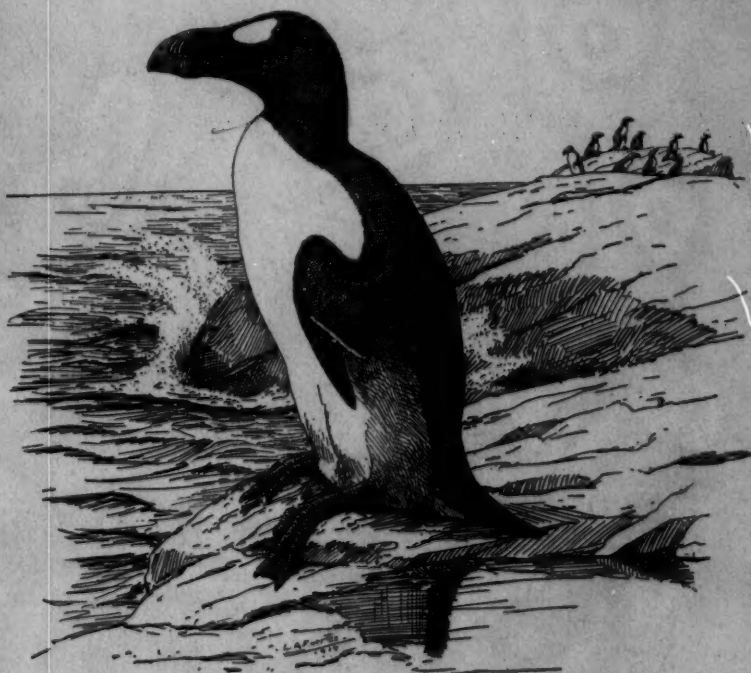
The Auk

A Quarterly Journal of Ornithology

Vol. LII

OCTOBER, 1935

No. 4



PUBLISHED BY

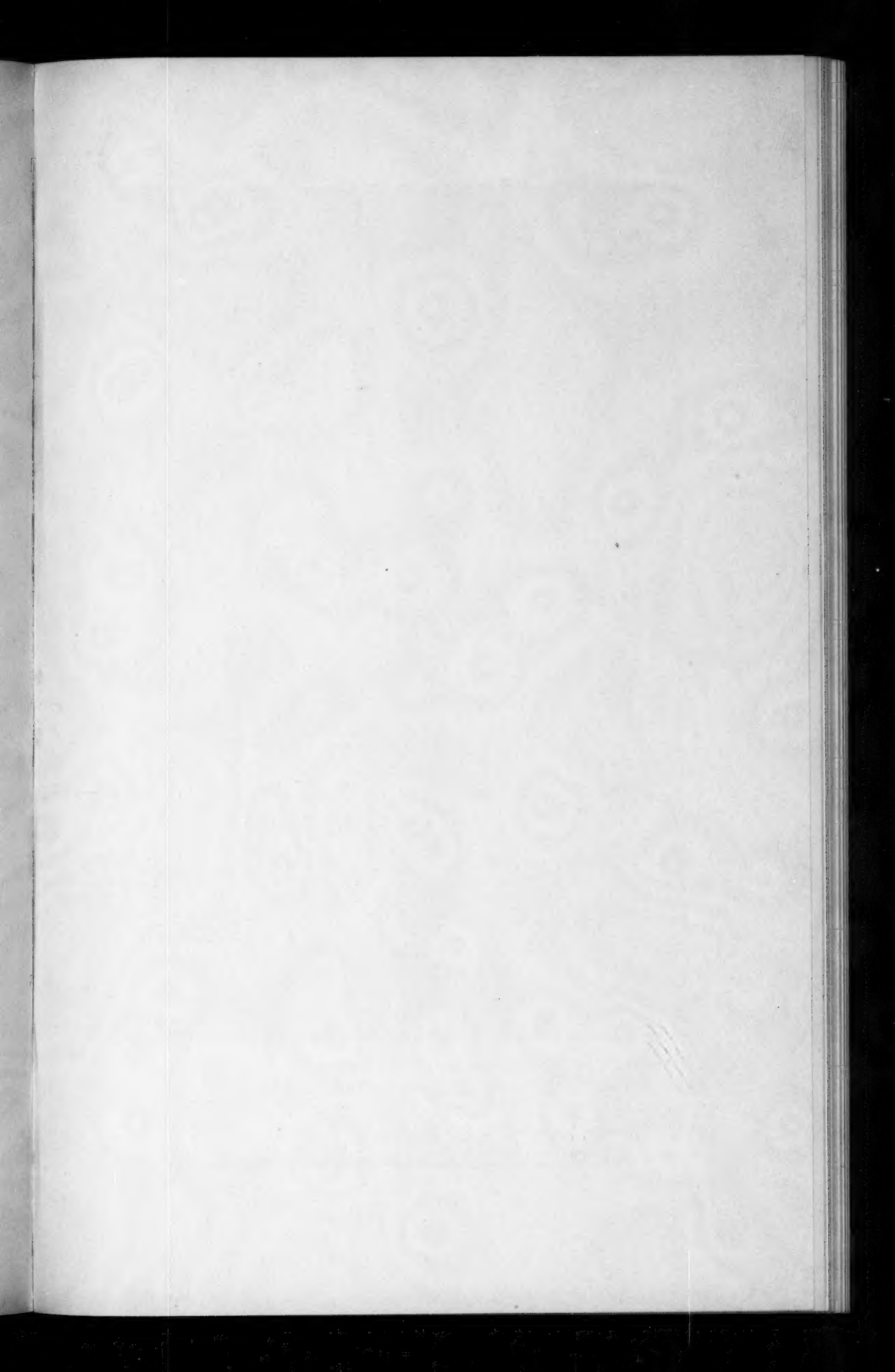
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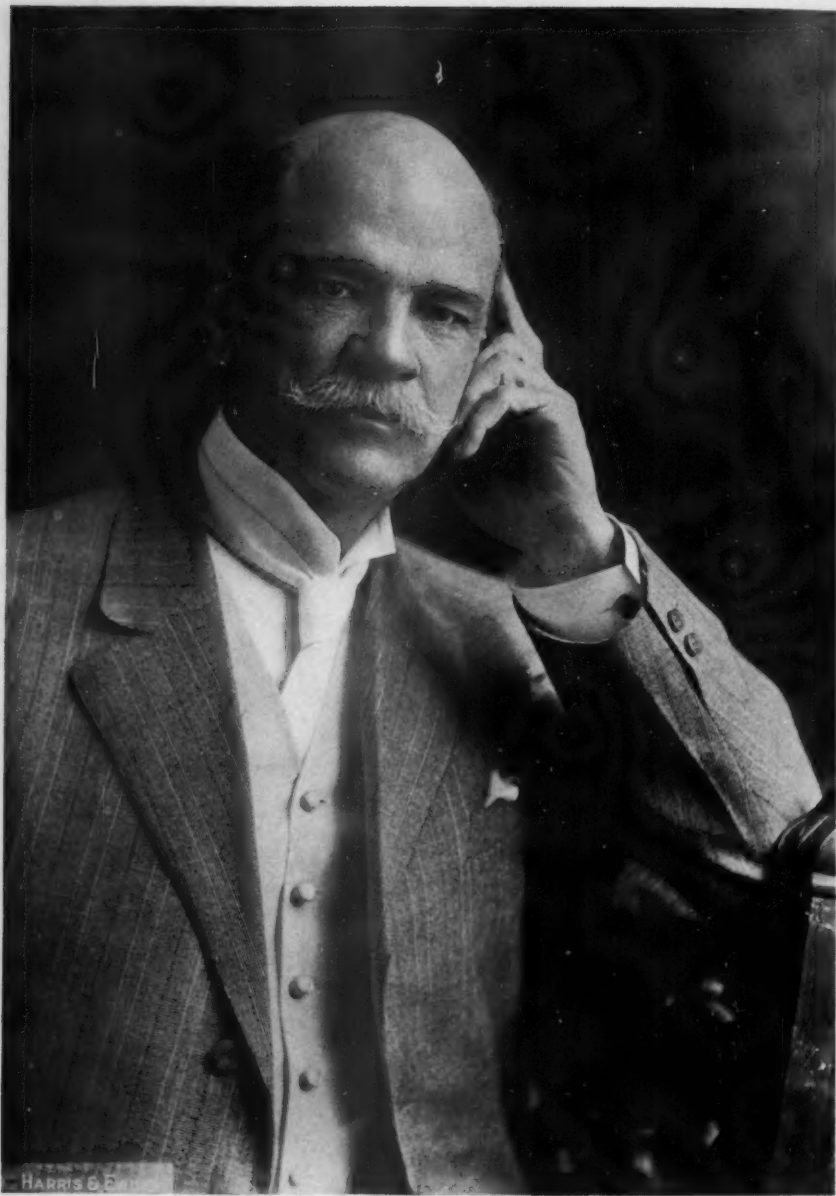
LANCASTER, PA.

Entered as second-class mail matter in the Post Office at Lancaster, Pa.

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Rev. Stimpert



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IN MEMORIAM: ROBERT WILSON SHUFELDT,
1850-1934.

BY PROF. KALMAN LAMBRECHT, PH.D., C.F.A.O.U., M.P.G.

Plate XVI.

ORNITHOLOGICAL science in America has lost one of its most zealous workers and pioneers. R. W. Shufeldt was from the eighties until the end of the second decade of the present century one of the most diligent and worthy investigators of detail in the science of osteology and paleontology of birds; he worked also in other fields; in general biology, anthropology, forensic medicine and museology.

He was the son of Admiral Robert Wilson and Sarah H. (Abercrombie) Shufeldt and was born December 1, 1850, in New York. He attended several schools in the United States and in Havana, Cuba, and in the Civil War, in 1864-65, he saw service as captain's clerk and signal officer with the rank of midshipman aboard the U. S. Gunboat 'Proteus,' commanded by his father. In 1872 he entered the medical school of Cornell University and in 1876 received his degree in Washington, D. C., from Columbian, now George Washington, University. In the same year he received an appointment as Lieutenant in the Medical Department of the Army and was ordered to Fort McHenry, Baltimore, Md., as assistant surgeon; later he served as surgeon on the frontier in the campaign against the Sioux Indians.

In 1882 Shufeldt was made a curator in the Army Medical Museum and afterward served as an honorary curator in the Smithsonian Institution. He was retired for disability from the army in 1891 with the rank of Captain and promoted to Major in 1904. At the time of his retirement he was serving as post surgeon at Fort Wingate, New Mexico. During the World War he was restored to the active list, placed on duty at the Army Medical Museum, and finally retired January 9, 1919.

Shufeldt began his literary activity when he was still a practicing surgeon. He had a rich zoological and botanical collection, the former forming the

basis of his first publications on the osteology and systematics of the different species and families of birds. Shufeldt was married three times, in 1876, 1895, and 1898. His first wife was Catherine Babcock, his second Florence Audubon, grand-daughter of J. J. Audubon, and his third a Norwegian lady, Alfild Dagny Lowum.

Prior to 1913 Shufeldt published more than 1100 articles, books, short notes and papers, many of his studies appearing in popular reviews of natural history.¹ The list of his works on anatomy and systematics of birds prior to 1909 appeared as a supplement to his 'Osteology of Birds' published as Bull. No. 130, New York State Museum, 1909, and comprised about 160 titles. All of his publications on the osteology of birds and on paleontology are cited in my work, 'Handbuch der Palaeornithologie,' Berlin, Berntraeger, 1933; and are quoted 256 times in the index.

With the exception of the Ostriches, and their allies and the Kiwis, Tinamus, Colies and Trogons, Shufeldt dealt very thoroughly with the osteology of the orders of birds. Taking them in their proper sequence, he contributed to our knowledge of the osteology of the following groups:

Osteology of Penguins, 1901; Taxonomy of the Pygopodes, 1892-1904; Bill of *Diomedea*, 1885; Osteology of the Tubinares, 1888, 1889, 1907; Osteology of the Steganopodes, 1898; Osteology of the Phalacrocoracidae, 1913; Description of the Osteology of *Phalacrocorax atriceps georgianus*, 1914; Osteology of *Nannopterum harrisi*, 1915; shoulder girdle of *Fregata*, 1904; Osteology of the Ardeines, 1889; and Herodiones, 1901; Osteology of the Water Birds, 1888; Osteology of *Palamedea* and *Chauna*, 1901; Monograph of the Genus *Dendrocygna*, 1914; Osteology of the Cathartidae, 1881, 1909; *Geococcyx californianus*, 1886; *Circus hudsonius*, 1889; *Pandion*, 1891; Accipitres, 1909; and *Pithecophaga jefferyi*, 1919; also Osteology of the Tetraonidae, 1881, 1909; *Agriocharis ocellata*, 1913; *Columbidae*, 1891, 1901; *Coccyges*, 1901; Osteology of *Nestor*, 1918; *Speotyto cunicularia hypogaea*, 1881, 1889; Striges, 1900; Trochilidae, Caprimulgidae and Cypselidae, 1887; osteological description of *Ceryle alcyon*, 1884; Halcyones, 1903; Pici, 1891, 1900; *Eremophila alpestris*, 1881; *Lanius ludovicianus excubitorides*, 1881; *Cinclus mexicanus*, 1881; *Tachycineta*, 1887; *Sturnella neglecta*, 1888; *Chamaea*, 1889; *Procnias*, 1890; *Sarcops calvus*, 1907; *Arachnothera magna*, 1909; *Anthochaera carunculata*, 1913; and *Habia melanocephala*, 1888.

Most of his osteological descriptions are fundamental and though written in the somewhat lengthy style of the eighties and nineties are of value because they treat of forms which have not been examined and described since.

Next to systematic questions, Shufeldt was interested in problems of comparative morphology, as seen chiefly in his 'Osteology of Birds' already

¹ In his bibliography (Medical Review of Reviews, XXVI, New York, 1920) there are more than 1500 titles. An incompleted autobiography appeared in 'Medical Life' XXXI, 1924.

mentioned, and in some of his minor papers: Complete Fibula of Birds, Patella of Phalacrocoracidae, etc. Special attention is due his 'Myology of the Raven (*Corvus corax sinuatus*),' 1890, which, together with Gadow's and Garrod's myological works, represents the best monograph of the muscular system of birds.

Beside the osteology of recent birds, Shufeldt studied also their paleontology. The bird remains from the Equus beds and the Silver Lake region, Oregon, dating from the Upper Pliocene to the Pleistocene, were made objects of his investigation; he also revised the Marsh collection of birds in the Peabody Museum, Yale University, and described 32 fossil species.

Several of his fossil forms have had to be revised as to their generic or systematic position. *Palæochenoides miocænus*, placed by Shufeldt in the Anserine group, belongs to the Pelicans, *Phalacrocorax marinavis* and *mediterraneus* belong to the new genus *Oligocorax*, *Tantalus milne-edwardsi* to *Pseudotantalus*, *Phasianus roberti* and *miocænus* to the genus *Archæophasianus*, *Grus marshi* to *Protogrus*, *Euphagus affinis* to *Scolecophagus*, *Palæospiza hatcheri* to *Palæostruthus*. The following forms have fared even worse: *Puffinus mcgalli*, *P. parvus*, *Ardea sellardsi* and *Larus vero* have been identified by Wetmore with *Puffinus puffinus*, *P. l'herminieri*, *Meleagris gallopavo* and *Nyctanassa violacea*, respectively; *Aquila ferox* and *Minerva antiqua* prove to be Edentate remains, and *Aquila lydekkeri* belongs to the new genus *Protostrix*.

In spite of these errors, Shufeldt has the merit of being one of the pioneers of North American Paleornithology. He described 43 new forms, and because of the pioneer character of his work, he was liable to make a few mistakes. Nevertheless, most of the forms which he described and named are valid.

His popular works on oölogy, museology and medicine are very numerous; he also contributed to mammalogical and herpetological literature by anatomical descriptions of *Heloderma suspectum*, *Amia calva* and a monograph of the *Procnitidae*. His most important anthropological work bears the title 'America's Greatest Problem: The Negro.'

Shufeldt was a collaborator of Newton's wonderful 'Dictionary of Birds.' He was one of the Founders of the American Ornithologists' Union and was transferred to the list of Retired Fellows in 1927.

After the World War we, in Europe, heard no more of him, and the many friends and colleagues with whom he had maintained an animated correspondence waited in vain for the usual interesting letters from him. His last years were passed in a sanitarium and, after a prolonged and serious illness, he died at Washington, D. C., January 21, 1934.

The memory of his active mind, his imperturbable love of work and his productive pen will long be honored in the annals of the history of ornithology, especially in the pages dealing with osteology and paleontology.

STUDIES OF THE SHORT-BILLED MARSH WREN
(*CISTOTHORUS STELLARIS*) IN MICHIGAN.

BY LAWRENCE H. WALKINSHAW.

Plate XVII.

DURING the past few years it was found that the Short-billed Marsh Wren occurred in suitable spots over the entire state of Michigan instead of in the southern part of the lower peninsula as was formerly supposed. Specimens have been taken from most of the northern counties in the upper peninsula wherever the habitat was suitable (Norman A. Wood and Leonard Wing). I have observed the species in Gogebic, Houghton, Iron, Baraga, Alger, Schoolcraft, Luce, Chippewa and Mackinac Counties in the upper peninsula, and have found the nests at Munuscong Bay in Chippewa County, while hunting for Rails' nests with F. C. Gillette. In the northern part of the lower peninsula the species has been observed at Douglas Lake in Cheboygan County¹ and I have observed it at Houghton Lake in Roscommon County and over most of the counties in the southern part of the state.

The favorite habitat of the Short-billed Marsh Wren is not among the large groups of cat-tails with several feet of standing water, but rather in the higher part of the marshes, in the intermediate portion between the bordering meadow and deepest part of the swamp itself. There is generally very little and often no water at all where they nest. These marshes are the favorite habitat for the Sandhill Crane (*Grus canadensis tabida*), Yellow Rail (*Coturnicops noveboracensis*), Greater Prairie Chicken (*Tympanuchus cupido americanus*), Savannah Sparrow (*Passerculus sandwichensis savanna*), Henslow's Sparrow (*Passerherbulus henslowi henslowi*) in the southern part of the state; Leconte's Sparrow (*Passerherbulus caudacutus*) in certain parts of the upper peninsula, and of the Swamp Sparrow (*Melospiza georgiana*) and Song Sparrow (*Melospiza melodia baeta*). This type of country is also the favorite haunt of the rattlesnake in its southern portion.

The flora of this part of the marshes consists mostly of small-leaved sedges, particularly those belonging to the genus *Carex*, and of small grasses. Among the many other plants which grow there Mrs. N. T. Peterson has identified the Royal Fern, Sensitive Fern (*Onoclea sensibilis*), Marsh Shield Fern (*Aspidium thelypteris*), Cat-tail (*Typha latifolia*), Wood Bulrush (*Scirpus sylvaticus*), Showy Lady Slipper (*Cypripedium reginae*), Calopogon (*Limodorum tuberosum*), some of the smaller willows, Fringed Gentian (*Gentiana crinata*), Bottle Gentian (*Gentiana Andrewsii*), Climbing

¹Wilson Bulletin, vol. 41, 1929, p. 250.



NEST OF SHORT-BILLED MARSH WREN WITH FEMALE, BATTLE CREEK, MICH. JULY 16, 1933.

Wild Cucumber (*Echinocystis lobata*), Tall Ironweed (*Vernonia altissima*), Joe-pye Weed (*Eupatorium purpureum*), Blue Vervain (*Verbena hastata*), Canada Goldenrod (*Solidago canadensis*), Beggar Ticks (*Bidens vulgata*), Nodding Bur Marigold (*Bidens cernua*), New England Aster (*Aster novae-angliae*), Yellow Dock (*Rumex crispus*) and Turtlehead (*Chelone glabra*). In the early part of the summer grasses and sedges predominate, and later the appearance of the marsh takes on the gay colors, the yellows and blues, of the goldenrods, asters and vervains.

The nests of the Short-billed Marsh Wren which I have observed were all in dense thick masses of small-leaved sedge, or in a combination of sedges and finer grasses. The nests are made of the culms of sedge and fine grasses interwoven into a globular mass, lined with smaller culms or grasses, and then with feathers, fur, pappus or other cottony materials. The nest is usually closer to the ground or water than that of the Long-billed Marsh Wren (*Telmatodytes*) and in much denser growth and consequently is much harder to find. The birds usually build several nests as does that species and the used nest is often a little closer to the ground than the false ones. The used nest in our marsh was thirty centimeters from the ground, which is about the average distance of the nests which I have observed. The false nests average about fifteen centimeters higher. The occupied nest was 25 to 28 cm. from the normal level of the water, and measured 101.6 mm. high, 82.5 mm. wide and 82.3 mm. from front to rear, externally. The interior, after the young had left, measured 63.5 mm. high, 44.5 mm. from front to back and 57 mm. from one side to the other. The opening was 25 mm. in diameter.

One nest examined was much smaller and the interior was lined with muskrat fur, feathers, pappus and other cottony materials. The opening was barely discernible on the side as is the case in many of the nests.

The nests examined during the summer of 1934, when all of the Short-billed Marsh Wren habitat dried up, were several centimeters higher from the ground than those previously examined. They averaged about 50 cm. from the ground. All were in dry locations. One of these nests examined had for lining feathers, mouse or shrew fur, and the downy part of the cat-tail. A few nests measure slightly larger than the measurements for the above nest and sometimes appeared to be started by drawing down the tops of the sedges to begin the outside of the ball. The openings of the nests measured from 15 to 25 mm. in diameter and in all of those examined faced either to the east or north.

Often the false nests of one pair will be located almost to the territory of another pair, in large meadows where they seem to congregate in colonies. In the marsh studied in Calhoun County, during 1934, in an area of about ten acres, there were as many as thirty-five or forty males singing at the

same time, while in other places of smaller size only one pair could be found. In one place a male was singing from a small group of cat-tails along the side of the road.

The eggs of this Marsh Wren are pure white in color and are ovate or pointed ovate in shape. They measure from 11 to 12 x 15 to 17 mm. The Short-bill has a rather large setting of eggs, varying from four to eight in number. A set of seven eggs found May 31, 1935, weighed 9.5 grams, an average of 1.35 grams per egg. As to the incubation period a nest found in our back yard during the summer of 1933, on June 22, had its first egg on June 23 and the complete set of seven eggs hatched on July 13-14. Allowing one day for the deposition of each egg the incubation period would be approximately 14 days.

This Marsh Wren nests during any of the months from May until September, in Michigan. I have observed nests during the months of June, July and August, one of which was found with one egg on August 5, but due to cattle grazing in the region it was trampled down. Of the eleven nests which I have observed eight were in June, one in July and two in August. If one considers the variation in time during which the nests were found it would appear that the Wren rears two broods and possibly three, at times, during the year, though probably some individuals rear only one brood.

The young of the Marsh Wren remain in the nest from twelve to fourteen days. They are fed by the female almost entirely but the male occasionally will stop to feed them. Excreta are carried away by the mother bird on her feeding trips to the nest.

When the weather was very warm, the young peered out through the opening, breathing very fast with mouths wide open. They showed little fear of man until they were about twelve to fourteen days old, then when one approached the nest they watched very dubiously.

After they leave the nest the young move about among the sedge and bushes of the marsh like little mice, except that they occasionally move up to secure food from their parents which feed them until they are able to take care of themselves, even then they move about in small groups until migration time.

The plumage of the adult Short-billed Marsh Wren has been described so many times that there is not much to add. The iris is brown and the legs and feet pinkish in color. The maxilla is brownish with paler tomia. The mandible is much lighter, yellow in color with the tip a little more buff, but pinker in life. The tail is barred for the full length in varying numbers of black cross bars, the width of which also varies.

The amount of white streaking along the crown also varies. In some birds it consists of long thin streaks and in others of very fine white dots.

The young have legs and bill pink, the latter a little darker near the tip of the maxilla. The young when they leave the nest are from 55 to 70 mm. in length. The top of the head on one specimen of 58 mm. in length, had no stripes, being dark brown changing to a lighter brown on the forehead. The back, rump and upper tail coverts were uniform hair brown, the wings a deeper brown, and the breast very similar but a little lighter, than that of the adult. The tail was 10 mm. in length, hair brown with one black band about two mm. in width at the tip. A bird 66 mm. in length had the coloration much the same, but there were indications of black on the wings and nape. In a bird 69 mm. long the head was colored the same, but the wings were barred with blackish and tipped with brown, and the back was barred with black. The breast on the sides was much more buffy and had a distinct band near the throat. The bills were decurved in these young birds. Weights of two birds have been recorded by Dr. J. Van Tyne, one an adult male weighed 8.5 grams; the other an immature, nearly full grown, 8 grams.

Migration dates are as follows:

Year	First	Common	Last
1929	—	—	Sept. 8
1930	May 2	May 7	Sept. 11
1931	May 16	May 24	—
1932	May 8	May 8	Sept. 1
1933	April 30	May 14	Oct. 22
1934	May 3	May 6	Oct. 14

The food of the Short-billed Marsh Wren consists of insects. They have been observed to feed the young, with moths, spiders, mosquitoes, flies, grasshoppers, and bugs.

With the Short-bill sings from the time of arrival in the spring until the departure for the south in the fall. During the months of April, May, June and July it sings almost continuously during the hours of daylight. During August, when many of our birds are extremely quiet, this species is still a persistent singer and even in September and October I have heard its repeated song at certain times of day.

Of the pair which nested directly back of our house in 1933, the male was heard to sing not only during the day but at nearly all of the hours of night. During the months of May, June, July and August I heard this male sing at various times; from 11.30 P. M. until 2.00 A. M., and until daylight. Then he would sing all day long until 9.30 P. M. but from 9.30 to 11.30 P. M. I never heard him sing. Sometimes between the hours of 2 and 5 A. M. he would sing as persistently as during the hours of daylight.

He usually sang his song once, then paused a few seconds before repeating. During the height of the nesting season he would sing once every five seconds for a period of several minutes. Many times when he was timed,

he sang twelve times a minute, while at others he would sing only six or eight times. After August 10 this bird did not sing nearly as often but he continued to sing early in the morning and late in the evening until he left on October 5. This Wren had favorite perches from which he would sing, two on willows, another on a wire fence which was about 100 yards from the nest. The two small willows, however, were only about twenty-five feet distant.

There seems to be some variation in the song. Usually this bird would sing one song each time but I have heard him sing twice in rapid succession on several occasions, the second song much shorter than the first, "Chap-chap-churr-churr-chur-r-r-chap-chur-chur-r."

The usual song is not repeated in quick succession but is given at the rate of once in every five seconds, and is merely the first part of the above, "Chap-chap-churr-churr-chur-r-r."

After the season had progressed into the months of August and September this became much less forceful and the opening became, "Sit-sit-sit-churr-chur-r-r," or "Sit-sit-sit-sit-t-t."

The height of the singing is during the nesting season and before. I have no proof that the female sings.

There are two alarm notes both with a dominance of the letter 'R' rather than of the letter 'K' as in the Long-billed Marsh Wrens scolding note. The scolding notes are "Churr-churr" and "Chap-churr."

The young were heard to utter a call before leaving the nest of "Chit-chit."

Most of the following notes were taken from my notebook, during observations from a blind.

June 22. Two nests of the Short-billed Marsh Wren were found in the marsh which comes up to our back yard and where the male sang so persistently from his date of arrival on May 11. Both the nests were empty but the old birds were in the neighborhood scolding. Following this date I left on a trip through the northern part of the state so that it was several weeks before these nests were again examined.

July 15. On examining the first of these nests it was found to contain six newly hatched young and one egg. The following morning the blind was erected within two feet of the nest and left there until after the young had flown.

July 16. Entered the blind for the first time.

11.30 A. M. The female returned immediately to feed the young while the male sang nearby. She fed the young three times during the next fifteen minutes then sat on the young for two minutes.

12.05. Returned to feed young.

12.09. Returned to feed young. Always fed young as she stood in the

doorway. Sometimes the bird would come from low down near the base of the nest, while at others she would come directly through the upper part of the reeds without watching or worrying about anything which might be in the vicinity. Sat on the young with her head at the entrance. The wind increased, rocking the nest and waving the reeds back and forth. She peered out then sat back on the young. Male sang nearby.

12.12. Left the nest as the wind increased. Appeared nervous.

12.17. Returned to feed young.

12.22. Fed young.

12.26. Fed young and sat on the nest. Peered out when the wind rocked the nest severely. I slapped the blind to frighten her off the nest but she only peered out through the opening. Finally by rustling the reeds at the base of the blind she was flushed from the nest.

12.30. Female came through the reeds beside the blind. Called "Churr-churr." Fed young. Male sang nearby, "Chap-chap-churr-churr-churr-r-chap-chur-chur-r."

12.39-12.43. Fed young, then stayed on the nest.

12.47. Left nest.

12.52. Returned to feed young. (Always when wind was down could be heard coming through the reeds but usually came when the wind was blowing the hardest.)

12.57. Returned, again called "Churr-churr," as she neared the nest. Removed excrement, carrying it in her bill some distance away, flying just over the top of the reeds.

1.02. Fed young.

1.05 Left nest.

1.10. Male sang. Female fed young then remained until 1.13.

July 17, 1933.

7.00 A. M. Entered blind. Female did not leave. Male sang nearby. After setting up the camera managed to frighten the female from the nest by rustling the sedge at the base of the blind.

7.04, 7.08, 7.12 and 7.16. Fed young, then sat on the nest.

July 19.

6.00 A. M. Entered blind when I heard Crows near its location. Neither parent was about the nest.

6.04. Female returned to feed the young. Removed excrement flying low over the sedge as she carried it away.

6.10. Brought several mosquitoes for the young.

6.14, 6.18. Feedings, then sat on the young until 6.23. Returned almost immediately to feed the young (this might have been the male for he was not singing).

July 20. 5.00 A. M. Male singing.

July 21. 2.30 A. M. Male singing.

3.00 A. M. Has been singing almost continuously sometimes as many as three times in one minute.

5.00 A. M. Male singing as many as six times in one minute.

12.30 P. M. Not singing. Young with feather tracts well defined. One much smaller than the other five.

July 22. 1 P. M. Male singing, a slower song now, "Chap-sit-sit-sit-sit."

July 23. 10.00 A. M. Banded six young.

10.30. Entered blind.

10.38, 10.40, 10.42, 10.45, 10.47, 10.50, 10.53, and 11.03 young were fed and during this time excrement was removed at 10.40 and 10.47. The 10.53 feeding was probably by the male because he sang very close to the nest then arrived just after the female left the nest from the 10.50 feeding. He sang only a few feet from the nest. Left blind.

1.30 P. M. Entered blind. Temperature 96 degrees. Young very warm. Five heads at the entrance with their mouths open.

Feedings at 1.35, 1.39, 1.41, 1.43 (spider), 1.46, 1.49, 1.51, 1.53, 1.58 (spider), (one young perched on top of the rest), 2.01, 2.06 (spider), 2.11, 2.13, (young called "Chit-chit." Adult answered nearby, "Churr-churr-chap-churr." 2.17, 2.24, 2.27 (fly), male sang, 2.30 (female fed, male sang). Very hot; storm approaching from the west. Male sang "Chap-sit-sit-sit-sit-chap-chap-chip-chip-chip."

2.35 (cooler). Female fed young three light colored spiders. Male flew between the nest and blind.

2.39. Female fed spider to young, male sang.

2.45. Fed large black spider. Wind began to blow very hard rocking the reeds and shaking the blind. Rain began to fall, increasing to torrents accompanied by another increase in wind. Rain lasted several minutes with the wind continuing. Old bird returned at 2.50 to feed young, then sat in the nest as it rocked back and forth. Lifted up and tried to remove band from one of the young several times.

July 24. 7.00 A. M. Entered blind and observed several feedings. At one time the female fed the young and was just leaving when the male arrived carrying another insect, proving for the first time that he did once in a while feed the young. After the feeding he flew around the nest then alighted at the entrance to flutter his wings and utter low whispered syllables of his regular song.

July 27. When I peered around the edge of the blind at 7 A. M. the young were very alert and all but the runt bolted out through the small opening. By night he too had gone. This was thirteen days after the last one had hatched.

July 30. 10.00 A. M. Female several rods from the nest with an insect in her bill, scolded "Churr-churr." Male sang nearby.

Male sang nearly every day, sometimes very little, at others nearly all day long. Sometimes he was heard to sing at 2. A. M. and later during the entire day. He did this on August 10. The following day he could not be found nor did he reappear until September 3 after which he was heard to sing during the early hours of daylight and again during the last minutes of daylight until October 5. The song was much more feeble than the spring song, having changed to a whisper song with the same syllables of which the earlier song consisted. At times during the latter part of September and the early part of October these birds were actually curious following through the bordering bushes as I walked along the edge of the marsh.

October 22. With Dr. R. E. Olsen, I visited the 'Big Marsh' fifteen miles east of Battle Creek where the Wrens had been so common during the summer months. Here we found at least five males singing about the time of sunrise.

SUMMARY.

The eggs of the Short-billed Marsh Wren require in the neighborhood of twelve to fourteen days of incubation. The young remain in the nest about thirteen days and they are fed by both parents but almost entirely by the female. The excrement is carried away by the female to some place distant from the nest. Storms do not appreciably disturb the birds for they fed the young on one occasion even though the rain came in torrents. The food consists of insects and many spiders. The male sang during the nesting season as many as twenty-two hours in one day. The only hours when he was not heard to sing were between 9.30 and 11.30 P. M.

Battle Creek, Mich.

MOCKINGBIRD LIFE HISTORY STUDIES.

BY AMELIA R. LASKEY.

THIS study of Mockingbirds (*Mimus p. polyglottos*) has been made by the banding method using Biological Survey aluminum bands and in addition colored celluloid bands for certain individuals. The study was centered about birds at my home but data were also secured from a number banded and observed at several other locations, the total number handled being 224.

Mockingbirds have proven most fascinating subjects for study as the species is not only noted for its colorful personality, but individuals display distinctive characteristics; behavior and reactions in two individuals may coincide in some ways but in other situations, are entirely different. This study has revealed why the song performance of the same individuals may vary greatly in two successive mating seasons.

My chief source of information was observations of the two color-banded males that are known to have been in our garden when bird banding operations started. How long before that time they lived there, it is impossible to say. One banded August 27, 1931, has been previously introduced as "B" because he was given a blue band; the other is known as "Y" banded October 12, 1931 and wore a yellow band (c. f. 'A Territory and Mating Study of Mockingbirds,' The Migrant, Vol. IV., No. 3.).

Movements.—My records indicate a definite movement, presumably migration, beginning in late August or September and continuing into November. During that period, daily trapping showed that the increased number of Mockingbirds about the banding stations was a shifting population, the banded birds repeating for a few days or not at all and new unbanded groups or individuals appearing. Among these transients, immature or female plumage predominated. At my home, by the end of November, most of these birds are gone. Remaining are the old resident males and one to three of the visitors that feel satisfied to stay for the winter if their efforts to establish territory are successful. Five individuals are known to have spent one or more winters at the banding station on their respective territories; one of these was a female, mate of "B."

During January and February there was considerable wandering noted among wintering Mockingbirds elsewhere. This was proved conclusively by deporting three individuals captured at the feeding shelf of a friend, banding them for sight identification, and releasing them three miles away in the suburbs. The first one, deported February 7, 1933, was not seen afterward, the shelf was again monopolized by an unbanded one within a week. A few days after he was deported, still another unbanded individual arrived. On March 12, 1934, the experiment was repeated. A bird already

in song was deported to the same location in a covered cage by auto and released after holding about an hour. This one returned, however, as his colored band identified him at the same feeding shelf 36 hours later.

In March and April, the returning females appear, with plumage fresh and clean, visiting territory where males, in sooty colored plumage are singing. They seem to move about until a home and mate to their liking are found. In 1933, several transient females were courted by "B" and "Y"; all left very shortly after they appeared except one which stayed with "Y" a week and then left. She was a nervous easily frightened bird which may account for her fickleness but both males finally mated in April.

In 1934, the female that mated with "Y" the previous year returned to the banding station March 27 joining him immediately.

Three males that defended winter territory at the stations left in spring without acquiring mates. Two left in mid-March. The other (called "L") remained singing zealously until the end of April then disappeared but was located in June about 500 feet south with an unbanded mate brooding three eggs. One Mockingbird appeared in "L's" vacated territory the early part of June sang lustily throughout the month, was unsuccessful in attracting a mate and he also disappeared.

No recoveries of my birds have as yet been made to verify the migration theory but one banded by Mrs. Arch Cochran in Nashville was trapped later in Corinth, Miss.

The following are my conclusions:

1. A migration in autumn of Mockingbirds, females and young predominating.
2. A return in spring of females, with the probability of some returning to nesting ground of previous year.
3. Dispersal of young an open question.
4. A wandering among winter residents.
5. Permanent or stationary residence of some males and fewer females.
6. Spring and early summer movements of singing males.

Territory.—Mockingbirds choose specific areas, usually, in Tennessee, during late autumn or early spring which they defend vigorously from their own and other species, particularly Robins, Brown Thrashers, and Cardinals. This pugnacity in defending territory is more noticeable in some individuals. The size of the area and its location varies somewhat in different seasons of the year apparently according to the needs of the bird. In winter "B" and "Y" occupied small areas close to the house, "B" on the east, "Y" on the west. In April 1933, when seeking mates, singing territory extended at least 100 feet farther. Each nesting cycle was responsible for a shifting of the boundaries to some extent. The middle rear section of our 200 x 300 feet lot was used alternately as part of the territory of each bird.

In three years' observations, both "B" and "Y" have confined all their activities to areas of about five acres each but the space occupied in any given time never exceeded half that size. Food supply, cover for roosting and suitable nesting sites seemed to account for this shifting.

Sometime in the period between late August and early November there is a readjustment in Mockingbird population about our home. Numbers of playful, immature birds are dashing about, their *chuck-chuck-chuck* calls are heard all day, sweet music delights one from singers concealed in dense shrubbery and there is some difficulty in determining whether some of these are "whisper" songs given by birds nearby or whether they come from a distant singer in a more energetic mood. Resident Mockingbirds are more or less inconspicuous during September. They are molting; family cares are over; and natural food is so abundant that it is not necessary for them to spend their energy in fighting. However in October and November belligerency is again asserted. By that time almost all the visitors have gone, the dense screen of leaves has thinned or fallen and again one may identify colored bands with accuracy. Each fall finds one to three of the visitors lingering on, each choosing a certain section. Then fights are frequent. Resident birds reassert themselves; dancing or sparring maneuvers on territory lines are of daily occurrence; vigorous pursuits are frequent as these new birds are chased from pre-empted ground; aerial fights are noted in which two or three birds may participate. By late November our lot is so well divided into Mockingbird territories that one could draw lines marking the garden boundaries established by these winter residents; the areas often extending somewhat beyond our lot into adjoining property.

In 1932, in addition to "B" and "Y," one of the new arrivals remained all winter. In 1933, a new male spent the winter in the same area occupied by the newcomer of the previous year. A female, "B's" mate, occupied one corner of our lot that had been part of "B's" section thus making a total of four wintering birds. Due to the death, in June, 1934, of "Y," "B" assumed charge of part of "Y's" regular wintering area. The female took her station just east of the house where "B" has spent three winters. Two strangers have remained, one in the female's former winter quarters; the other in the usual area occupied by the various newcomers each year, making a total of four for 1934. This last named area has been occupied in turn by six Mockingbirds in various seasons since the fall of 1932 but has never been used by any for nesting. It is planted in shrubbery and evergreens and has served during the past six years as nesting sites for Robins, Thrashers, Catbirds, Indigo Buntings, Chipping and Field sparrows.

Resident Mockingbirds continue throughout the winter and the spring

seasons to participate in dance maneuvers on their respective boundary lines. This dance has been described many times. The birds face each other, step backward, forward, sideways, usually ending with a sudden turn, each flying in the opposite direction on his own side. These maneuvers have been witnessed repeatedly and they have, within my experience, always occurred as manifestations of territory rights. Twice it has been seen with the female (B's mate) participating with an unmated male in spring. The attitudes of both birds were exactly like those of two males; none of the rasping *cha* notes, so characteristic of amorous advances were given. Again on September 9, 1934, she and "B" were seen in this maneuver on the old boundary line where "B" and "Y" had performed so many times in the past. "B" was attired in his new fall plumage but the female was still ragged, apparently in process of molting. At the conclusion she flew to the section she is now occupying as winter territory while "B" busied himself hunting insects. It seems their dance could be interpreted in one way only, an act of dismissal, a manifestation of the severing of ties that bound them during the reproductive season. Last year, from autumn until early March, they were indifferent to each other. Had the female not been distinctively banded on the left tarsus, she could easily have been mistaken for a wintering male holding territory. Observations this fall substantiate this, for in November, she and one of the new arrivals engaged in a boundary line argument as they met in a tree; she retreated, the new bird following; the affair terminated in an aerial fight, both combatants whirling over and over until they dropped to the ground and separated, the intruding male then leaving for his own side.

This new arrival has had to win his winter territory by sheer force as each of the other three residents has granted him space only after one or more fights and pursuits.

I conclude that:

1. Resident Mockingbirds must win territory but when acquired, their rights are respected by neighboring Mockingbirds.
2. Permanent residents change specific territorial areas to suit their needs.
3. A wintering female occupies separate territory. Though it joins that of her former mate and had belonged to him, he does not trespass.
4. The dance is a manifestation of territory rights.

Song and Mating.—After a period of silence lasting from December to late February or early March, "B" and "Y" began to sing soft little songs as they perched on low limbs. In 1933, the first song was heard February 26 but in 1934, a cold stormy season, the first was given on March 4, the birds beginning both years within three days of each other. The song performances of these two birds in the two seasons proved to be an interest-

ing study in contrasts. Both temperature changes and the mating urge were seen as factors affecting the songs of "B," "Y" and others under observation at the same time. In March particularly this was noted. A chart showing weather conditions and songs indicated that song performance synchronized to a marked degree with the rise and fall of the thermometer. Songs increased in length and volume on warm days, decreased when weather was chilly and unpleasant, sometimes ceasing entirely for several days. "Y" was less susceptible to early weather conditions than the others.

In 1933, the early March songs of the two unmated males, "B" and "Y," were of the soft toned type, often of considerable length, given as the birds perched low, either on fence post, in shrubs, or on lower branches of trees. By March 24, their zeal was expressed not only in the louder, faster songs but was emphasized by flight songs and by tossing into the air as they sang. For several days this ecstatic period continued. They sang from telephone poles, tree tops, and a peak of the house; gliding to the ground, flying the length of their respective territories, singing constantly. Each apparently tried to vie with the other and both gave their full repertory of imitations with spirited exuberance.

On March 28, the first female stopped in the garden. Her arrival was responsible for a new type of behavior which it was noted later was characteristic of the period from the arrival of a female until a mate was obtained. The ecstatic singing ceases, *cha*, hissing or rasping sounds are given by both sexes, the male pursues the female on his territory in swift flight. (Later a little ground pursuit among the shrubs may occur.) Then, when she stops to feed or perch or moves away from his territory, he with head down, tail and wings spread flies into a shrub, a vine, or runs along a tree branch into a fork, giving a coaxing *cluck-cluck*. He dashes to the ground, picks up a twig or other nest material and flies into possible nest sites with it. The female often accompanies him into the shrub or vine for a moment or two. If she stays on his territory hunting food, he remains near her as if to guard her for he perches high enough for a clear view and at the approach of possible danger, a little song is sung or a warning sound is given similar to that of the Brown Thrasher, as a danger signal. "B" used the song; "Y" the call.

If the female does not stay, the male resumes his tree top perch and zealous singing, possibly repeating this performance many times until mated. Several females came to the station before "B" and "Y" finally secured mates on April 8 and April 10, 1933, respectively.

There was considerable rivalry displayed by "B" and "Y" and a neighboring male over these visiting females as the visitor circled about. Usually each male remained in his own territory attempting to lure her to

his side by singing or by the nest building maneuver while she was being pursued by the other. Occasionally one male in his eagerness would trespass, resulting often in a fight, the trespasser being chased to his own realm.

None of the visiting females remained longer than a few minutes except one. This individual stayed a week and apparently had accepted "Y" as her mate, though occasionally she went into "B's" side of the garden. He would fly toward her but "Y" immediately appeared between them, sometimes driving "B" back and apparently chasing the female home. "Y's" solicitous care was most engaging as he sang sweetly nearby when she went to roost in shrubs near a window one evening. Before he had gone to his roost in another clump of shrubs, she became frightened and flew to him. He then returned with her and settled on a twig about a foot from her for the night. The following evening she roosted alone in the same place but about 9 P. M. she was again frightened, and with a few sharp *chucks* she flew away in the bright night. "Y" responded with a little song from his clump of shrubs. But she left and the next morning "Y" was singing madly from his favorite tree top, calling once more for a mate.

The situation in 1934 provided an entirely different background for song and mating observations. The female that had mated with "B" the previous year and raised two successful broods remained at the banding station throughout the winter in the north east end of "B's" territory. She stayed until February 14 when she disappeared from her usual perching places and no search was made for her in the vicinity of our home. However on March 4, a mild day, "B" was heard very early in a few notes of song. On the 5th, he sang intermittently throughout the day in moderate tones. On March 6 with the weather still mild, he began to sing early but at 9.30 A. M. rasping *cha* sounds indicated the arrival of a female. He was pursuing one on his territory, then in a few moments he began flying into the rose vines with the new arrival following. She was soon identified as his color-banded mate of last year and remained to remate with him. "Y" began to sing softly the day previous to this (March 5) and continued in the moderate toned type of song for several days. He was not at all concerned with the arrival of "B's" mate and ignored her presence entirely. On March 9, the weather changed, bringing snow flurries the following day and it continued unpleasant for a few days. During that time all singing ceased. "Y" alone began to sing a little on the 12th though it was still cold. He continued, gaining fervor, and by the 16th was using high perches for his vigorous singing. On March 18, humid and mild, at 8 A. M. *cha* notes were heard. "Y" and a female stood on a garage roof facing and *cha-ing* each other but standing perfectly still. They both flew into the garden and it was a most unexpected pleasure to find that she, too, was his color-banded mate of last season. It was interesting to note that her

plumage was considerably lighter than those that had wintered at the banding station so she must have spent her winter in a cleaner section than the Nashville area. Another siege of inclement weather with snow and ice enveloped this city but "Y" did not entirely cease to sing though some days his only effort was an evensong.

The behavior of "B" and "Y" in late March and early April of 1934 was markedly different from the corresponding period of 1933. The return of their respective mates of the previous year, while they were still in the early stages of the singing phase, doubtless was responsible for the contrast. The 1934 performance lacked the prolonged spectacular features, the wild frenzy, and the fighting of the 1933 period. There was no rivalry displayed between the two males over the females and each ignored the companion of the other. Neither bird was seen in pursuit of any other female and no visiting females were noted on their territories. The unrestrained ardor of 1933 was doubtless their announcement to passing females of their eagerness to mate but in 1934 they were joined by the females before the mating urge had reached its culmination.

There were some differences in the song habits of "B" and "Y" which seem to be accounted for by the difference in personalities. "B's" singing declined on the unpleasant chilly days of spring but in June and early July of 1933 and 1934 he displayed his singing ability both day and night, sometimes for no apparent reason relative to the nesting cycle. The egg laying periods were marked by some zealous singing from high perches with an occasional flight or tossing in song. "Y" almost ceased singing when the young hatched but "B" sang most excitedly at that time for a few days. "Y" never was heard singing at night and his zealous singing periods usually coincided with the pre-mating and the egg laying periods. However "Y's" devotion to mate and young was very highly developed while "B" assumed few responsibilities. Therefore when the lovely June nights came, "Y" was burdened with family cares while "B" felt free to serenade in the moonlight.

The female which mated with "B" in 1933 and 1934 remained through the winter of 1934-35. The temperature during January was unusually high and the excess for the month up to the 12th was 99 and reached 162 by the 19th. At 10 A. M. on January 10, "B" was heard singing a lengthy moderately toned song while two other males one about 100 yards distant, the other three miles away, began to sing about the same date. At 4 P. M. he met the female (which we may call "Bf") in the trees at their boundary line. The *cha* notes were heard for the first time. There was plumage display by "B" and pursuits by him from branch to branch "Bf" often flying to him. The wooing did not start with the preliminary swift pursuit through the air; the dashing into shrubs with nesting material and the

animated singing as in the previous years; but it must be remembered that "Bf" had been constantly in her territory all winter. On January 11 (temperature 45 midnight; 55 noon). Courting continued on combined territories of "B" and "Bf." Once when "B" was on the ground under shrubs "Bf" joined him and stopping about 18 inches away picked up a dead leaf and dropped it at her back, then picked up a small twig and flew to a nearby tree. This immediately provoked "B" to follow her and resume courtship. At intervals they fed on hackberries and apple and between pursuits a seed was regurgitated. "Bf" always evaded "B" when he came close or assumed a pouncing attitude and she used a *chuc* or *chick-chick* scolding note to repulse him.

January 12-13. Wooing continues with pursuits in the air and in trees with stops in the evergreens "B" always the pursuer "Bf" returning to him and perching near him but evading his advances. "B" sang a few little songs but so soft they were almost inaudible a few yards away. Little musical calls were used by him when perched on guard while "Bf" searched for food or rested; she was hard to locate between pursuits. "B" accompanies her each night to her regular winter roosting place about 5 P. M. He perched on trees sometimes with the little song, sometimes the musical notes, and at dark flew to his winter roosting place.

January 14 (temperature 29 midnight; 38 noon). No songs or musical notes heard; but *cha* notes heard in pursuit; soft toned by "Bf" and often louder by "B" like *zah* or *zee*. Similar courting actions continued at east to January 19.

The behavior of these birds in 1935 corresponds with that of the same pair in early March, 1934, for the first week after the female joined "B," but differed as described under January 10 while the behavior of "Bf" on January 11 was not observed in either of the preceding years. This does not mean that it did not take place since the shrubbery was often dense enough to obscure the birds.

I conclude that:

1. Both temperature and the mating urge influence the songs of spring and early summer.
2. The period of most ecstatic song with acrobatic accompaniments occurs when the mating urge is stronger.
3. When first joined by a mate, songs decrease, sometimes only short morning and evening songs are given.
4. The egg laying period is marked by some zealous singing from high perches with an occasional glide or tossing.
5. Singing continues through the brooding period in a more tranquil manner.
6. When young are hatching individuals react differently.
7. Some individuals sing in winter as late as December 25.

NEST RECORDS.

"B."

April 8, 1933. Joined by mate.

Nest No. 1. In rose vine. No eggs found.

No. 2. In young cedar. 2 young left nest.

No. 3. In maple tree. 3 young left August 17.

March 6, 1934. Rejoined by same mate.

Nest No. 1. In neighbor's arbor vitae. Only 1 egg found later.

No. 2. In rose vine. 4 eggs—first laid April 21. Robbed of young.

No. 3. Shrub at neighbors. 3 eggs hatched May 31. Robbed.

No. 4. In hackberry tree. 3 eggs hatched about July 6. One bird banded July 11.

No. 5. In maple tree same as No. 3 last year. 3 young banded and left nest August 11.

"Y."

April 10, 1933. Joined by mate.

Nest No. 1. Built under projecting creek bank on exposed roots. Fledged 4.

Nest. No. 2. In sycamore tree. Three young left about August 15.

March 18, 1934. Rejoined by same mate.

Nest No. 1. Built in same place as No. 1 last year. 4 eggs. Hatching April 24 but killed by something.

Nest No. 2. In honeysuckle vine. 5 eggs. Hatched 4. Three young left nest May 29.

Nest No. 3. In privet shrub. 4 eggs. Set complete June 8. Robbed June 13.

Nest No. 4. Nest built in hackberry tree but "Y" was found dead June 18. No eggs found.

Nesting.—Although earlier mating may account for the increased number of nesting attempts in 1934, it is quite possible that the unsuccessful nests of 1933 were not all located. Mockingbird habits were not so well understood that year. They have one habit that was very misleading at first. They continue to investigate nesting sites even while their eggs are being brooded elsewhere. Consequently while the observer is watching for building activities in one place, the nesting procedure is far advanced elsewhere. Sometimes these other sites are used for later nestings; other times they are not used. For this reason the nests of the "B" and "Y" families were seldom located in 1933 until the whining of the young or the feeding activities disclosed them.

In nest building the mated pair work together but brooding is by the female exclusively. "Y" was most assiduous in guarding the nest during

the brooding and feeding of the young. He was persistent in his fussing and pugnacity when one approached the nest or its vicinity. Nest No. 2 was built in a honeysuckle vine on the garage near a walk that was the center of our outdoor activities. He resented our sitting in the garden or working in it. His harsh *chucks* evinced his displeasure and he frequently attacked me as I examined the nest, attended banding traps, or worked among the flowers. He would pounce on my head or back, striking with both feet, scolding loudly. He would follow me from front to rear of the 300 foot lot, sometimes flying ahead, with strident *que-ah* scolding notes, striking repeatedly. That he recognized me as the intruder who visited his nest was quite evident for all his attacks were directed to me while for others scoldings were deemed sufficient. "Y" hunted food for the nestlings but he spent so much time fussing at presumed enemies that usually the greater part of the feeding was done by the mother bird. She scolded if one came near her nest but never attacked. When she left the eggs on one of her frequent absences, they evidently watched from some distance for, at the approach of someone to the nest, both came scolding. After the young had left the nest, "Y's" pugnacity decreased and he assumed the greater portion of their care as well as assisting in building the new nest.

On the other hand "B" was not at all pugnacious toward human beings, offering no objections when his family was visited. The only sign of interest he showed was to fly to a nearby perch and watch silently. Only once was he heard scolding as the young were banded in the nest. Both last year and this when a ladder was placed at the later nests in high trees, all the scolding was done by the female and "B" either did not appear at all or kept his distance. In the "B" family, apparently all the feeding was done by the mother and she assumed the care of the fledglings.

As it was not deemed feasible to visit all nests daily, data were obtained from the one very close to the house in the honeysuckle vine. On and before April 9, "Y" and his mate had been interested in this vine, going into it occasionally although she was at that time brooding four eggs in Nest No. 1 at least 200 feet west. Again on the 20th, she was seen entering. Her young began hatching on the 24th. On the morning of April 26, there was a commotion in the vicinity of her nest, involving Mockingbirds, Jays, and others. That afternoon the "Y" pair were seen carrying nest material into the honeysuckle. Investigation revealed two dead young on the ground near the empty nest. On April 29, Nest No. 2 was lined and the first egg laid May 2, and on May 6, the set of five was complete. On May 18, young were hatching. Their "whining" was heard first on May 24. They left the nest May 29 and that night roosted in the vicinity of the honeysuckle vine. Nest No. 3 of this pair was started about a hundred feet south on June 1; finished June 3. First egg laid June 5 and the set of four

completed June 8. The young of Nest No. 2 were still nearby on June 5 for their whines were heard and "Y" was seen carrying food that day and they were not located again. However on June 22 (after the death of Y) the female was seen feeding a full grown begging youngster wearing a band, which must have been one of the No. 2 brood for that was her last successful nest. She disappeared soon afterward.

It has been difficult to get information relative to the length of time the young are fed by parents and mine has been only casual. A color banded female nesting in the neighborhood came to the banding station for apple and on June 18 was seen feeding some to a youngster of a former brood about one month old. Her present brood had just hatched (June 17). On the 20th when he followed her again, she repulsed the begging youngster without feeding him at all.

As to nest life I conclude that:

1. A Mockingbird may lay 5 sets of eggs in a season.
2. Nest is built by the pair together.
3. The female does the brooding.
4. Eggs are hatched in approximately 12 days.
5. Young leave nest about the 11th day.
6. Some males assume the responsibility of feeding the young.
7. Degree of pugnacity in protecting nest varies among males. Females scold but do not fight human intruders.
8. Early nests are built at low elevations. Late nests usually in trees.

Plumage.—Sight identification of the sexes by means of plumage in Mockingbirds is impossible though the female is known to average smaller in size and to have more restricted areas of white in wings and tail. While walking or perching, the amount of white displayed by any Mockingbird varies according to the position in which the wing is held and no sight comparison is dependable. Any individual may appear to have a prominent white wing spot and at other times none at all.

To distinguish sex of the bird in hand, examination of the rectrices has proven most successful thus far in my experience. All birds known to be adult males have had no dark areas on the outer pair of tail feathers while the several females examined have a plumbeous area on the inner web, like the immature birds. In very young birds these dark areas are relatively large.

A number of Mockingbirds have been seen in early spring with the outer pair of tail feathers in process of replacement. Whether this is an accidental or a natural occurrence has not yet been determined.

In adult birds the iris of the eye is usually orange or yellowish orange, but juvenile Mockingbirds have gray eyes, gradually changing from the center toward the rim of the iris. During the autumn influx of young birds

many are noted in all stages of transition from gray to yellow but no bird banded from the nest has remained long enough to determine the exact age at which the adult color of the iris is attained.

Postscript.—On January 22, 1935, after twelve days courtship of the "Bs" the temperature dropped in one day from 59 to 14, followed by snow. Each bird retired to its own territory and they took no further interest in one another until March 3 which was almost the same date "Bf" had joined "B" the previous year. "B" started to sing again and courtship began once more but unfortunately he disappeared soon after, evidently the victim of some predatory creature and "Bf" mated with a year old male occupying territory about 75 yards distant. "L" immediately returned, settled on "B's" old territory, mated with an unbanded female and they raised their first brood early in May.

Graybar Lane, Nashville, Tenn.

THE LIFE HISTORY CYCLE OF LEACH'S PETREL
(*OCEANODROMA LEUCORHOA LEUCORHOA*) ON
THE OUTER SEA ISLANDS OF THE
BAY OF FUNDY.

BY WILLIAM A. O. GROSS.

Plates XVIII-XXI.

Introduction.—On the isolated islands at the mouth of the Bay of Fundy, Leach's Petrels have found a refuge from the persecution that has befallen them on many of the nesting colonies along the North Atlantic seaboard. Their continued existence in this part of the world is largely dependent upon the success of these breeding colonies. Tabulations of comparative numbers made over a three year period show that even in this region the birds are rapidly decreasing in numbers.

Kent's Island, which has recently been presented to Bowdoin College by Mr. J. Sterling Rockefeller as a bird sanctuary and a biological research station, is the site of a flourishing colony. It was there and at neighboring islands that this investigation of Leach's Petrel was made. Kent's Island offers many opportunities for the ornithologist and particularly the bird ecologist. It is the home of thousands of Herring and Black-backed Gulls, Eider Ducks, Guillemots, and other marine birds. Four species of Swallows (Tree, Barn, Cliff and Bank) are always in evidence about the laboratory. Scores of Savannah Sparrows nest in the field in the center of the island. The northern section is heavily wooded with a dense growth of virgin spruce which offers nesting sites for Flycatchers, Brown Creepers, and similar types of bird life. The majority of the Petrels nesting on the island were found in this section, and with this group I dealt particularly.

Kent's Island is about two miles long and a quarter of a mile wide at its narrowest point. Together with two smaller islands, it forms a group known as Three Islands. They appear on the Government charts at Lat. $44^{\circ} 34' N.$ and Long. $66^{\circ} 45' W.$

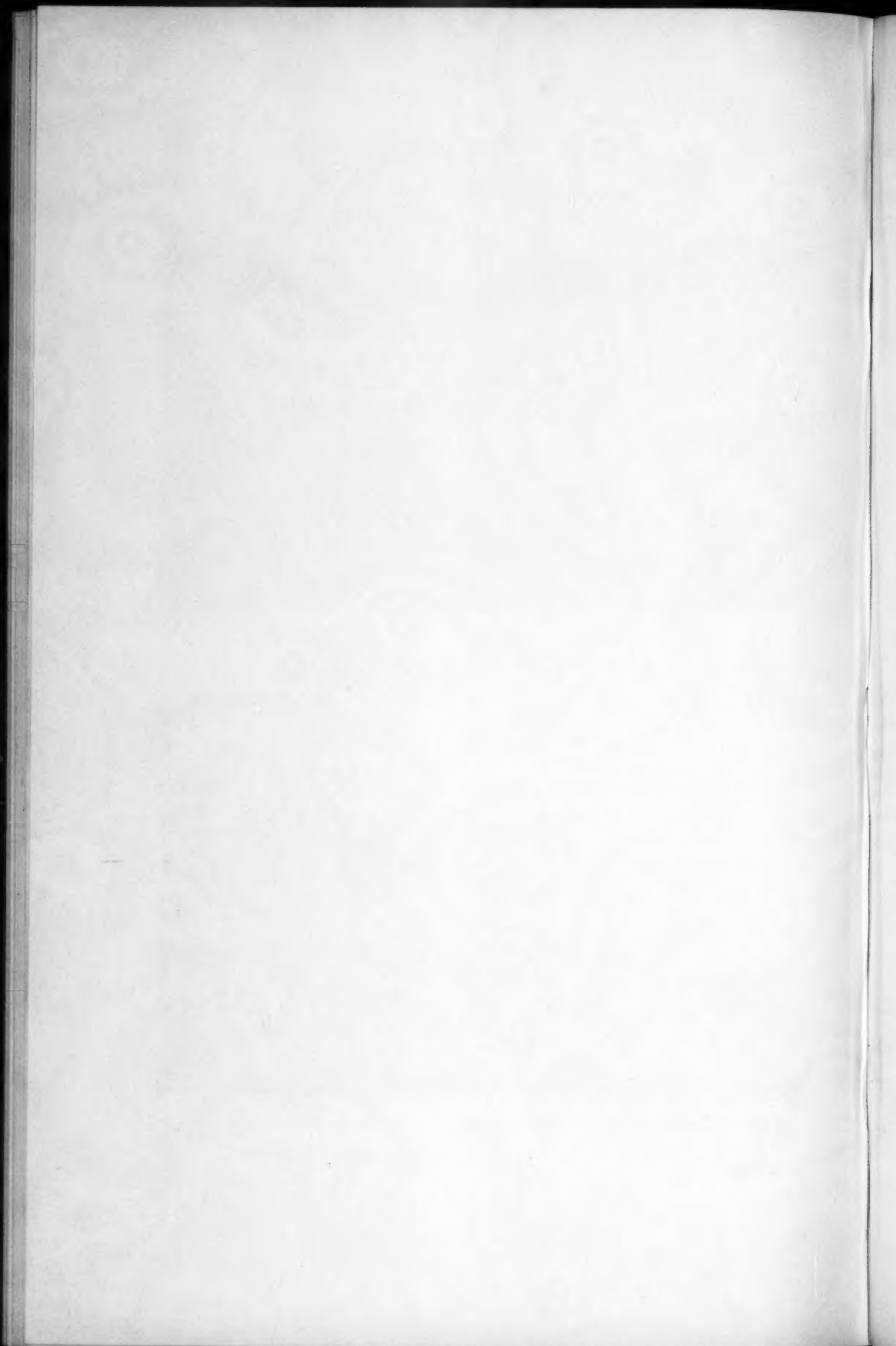
Approximately a mile to the north of the group is a small barren island known as Green Island. This is one of the most thriving colonies of Petrels that I have ever visited. It is uninhabited by man, but a fisherman keeps cattle on the island which indirectly have been a factor in the survival of the colony. By trampling upon the nests of any Gulls which might attempt to establish themselves on the island, the cattle have rid the Petrels, which nest underground, of their worst enemy.

During the summer 325 Petrels were banded on this island alone. Green Island because of its small size and the character of its surface lends itself well for a study of Petrel populations and especially of fluctuating changes in their numbers from year to year.



UPPER. LEACH'S PETREL COLONY. THOUSANDS OF BURROWS AMONG THE ROOTS AND BRUSH OF THE CLEARING.

LOWER. BANDING PETRELS ON GREEN ISLAND; A TYPICAL COLONY.



Present Status.—It would be difficult to determine the number of Petrel burrows on any of these islands, but the following estimates will serve as approximations: Kent's Island 10,000, Green Island 2000, Little Wood Island 12,000, Machias Seal Island 3000, and White Head Island 500 burrows. A few years ago the colony on Little Wood Island had thrice its present population, and Machias Seal Island ranked as one of the largest breeding grounds. On several small islands where the Petrels were once abundant the species has completely disappeared. However, if adequate protection should be given the birds in colonies such as the one on Kent's Island, their numbers can be maintained and possibly greatly increased in the course of a few years.

One of the causes for the marked decrease of the species is the Herring and Black-backed Gulls; the indirect victims of Gull over-population are the Petrels. One can pick up the regurgitated remains of dozens of birds in the morning along the shore after a night of full moonlight. The awkward, erratic flight of the Petrels makes them easy prey for the Gulls who stand guard along the shore and exact a heavy toll upon the bewildered birds which come fluttering in from the sea at night time.

To test the ability of a Gull to swallow adult Petrels, an experiment was conducted with a captive Black-backed Gull at the laboratory. In twenty minutes this bird succeeded in swallowing five birds in their entirety! Furthermore, Petrels released during the day near a Gull colony were invariably captured and devoured by the more powerful and swifter flying Gulls.

Dogs, cats, rodents and man have also been contributing factors in the destruction of this bird. Records show some very devastating results caused by dogs running loose on island colonies. For example, on Machias Seal Island the entire Petrel colony was at one time being rapidly exterminated by a dog until the latter was removed by the National Audubon Society.¹ At this same colony I found that the lighthouse was responsible for the deaths of considerable numbers of birds. The Petrels attracted by the light flutter around the beacon in circles until exhaustion overtakes them. Bodies picked up at the base of the lighthouse showed no external injuries which would have been caused if the birds had crashed into the glass windows. The British have had good success in erecting perches around their beacons for any birds who might be attracted to the light.

Egging expeditions by natives have offered an opportunity for children to maraud Petrel burrows in their game of competitive egg collecting. On certain islands this pastime has proven to be the cause of no little nest destruction and disturbance to the birds.

Petrel Mythology.—Tales of Mother Carey's Chickens are present in the

¹ Bent, A. C., 1922, U. S. Nat. Mus. Bull. 121, p. 144.

folk lore of many nations. These little wanderers of the sea have also been the source of much speculation by ocean travellers. Sailors have said that the bird carried its egg beneath its wing and hatched the chick while flying at sea. A game warden in all seriousness told me that he had seen a strange incident on the fishing grounds in calm weather. The Petrels settled down on the glassy surface of the ocean, turned over on their backs, stuck their wings up in the air, and went sailing away like toy boats.

A member of the Life Saving Station crew on Little Wood Island became quite emphatic when I attempted to differ with his statement that the chicks are imprisoned by their parents in the burrows with sufficient food to live through the winter. He said that he had frequently unearthed chicks in the middle of winter when snows covered the entire surface of the ground. The young according to him were released when the melting ice and snow of spring left the burrows open.

On foggy nights mariners are said to tell the proximity of Petrel islands by the strong odor of the birds. This musk smell is an inherent characteristic. Museum specimens retain the odor almost indefinitely, and the entire body of the bird is scented with it. In bird banding we used this smell as an effective aid in readily determining whether the burrow was occupied.

The most inexplicable phenomenon which I and others have noticed is the absence of Leach's Petrels at sea during the day. There should be at least 10,000 members of the species flying about the outer reaches of the bay for food during the daytime. But seldom does one ever see a Leach's Petrel on the fishing banks while Wilson's Petrels can be tolled up to the boats at almost any time.

Many characters of Petrels would intimate that they have a strong sense of smell. Birds can be tolled up to the boat in a thick fog by putting out some odorous cod livers. In these instances the Petrels could not have located the bait by sight nor could they have come upon it by accident. The musk smell, which we associate with all Petrels, may be a highly differentiated characteristic of the individual bird. If the latter is true, we can explain the ability of the birds to single out their mates in the dead of night.

"Mother Carey's Chickens" is the usual common name of the Petrels. There are several variations in use in the Bay of Fundy such as "Kerry Chickens," "Mother Careys," and occasionally, "Stormy Petrel."

Geographic Range.—Leach's Petrel is a wanderer of the seas. Its range extends in the Atlantic from Iceland to the equator. In the Pacific it is found from Bering Sea to the Galapagos and the Hawaiian Islands. It breeds in the Kurile Islands, north to the Commander Islands, and east to the Aleutian chain. On the eastern side of the Atlantic ocean it is found on islands of northern Great Britain (St. Kilda, the Blaskets, and the Hebrides).

The southernmost record of its breeding along the New England coast is from Penikese Island at the mouth of Buzzard's Bay, Massachusetts.¹ In this instance the Petrels are said to have built their nests under a huge pile of rocks where it is impossible to reach the eggs. Although the nests have not been seen, the presence of the birds constitutes an important record which has been verified by competent ornithologists.

There are several colonies along the Maine coast, of which the one on Great Duck Island is the most important. The most extensive breeding grounds are on the islands in the outer reaches of the Bay of Fundy: Machias Seal Island, Little and Big Wood Islands, Kent's Island, Green Island, and Nova Scotia Seal Island. Other colonies are on Bird Rock and St. Paul's Island in the Gulf of St. Lawrence and on St. Peter's Island on the Newfoundland Labrador coast.

The most northerly breeding colony along the Atlantic coast is probably St. Peter's Island which is a short distance south of Battle Harbour. Petrels are known to have breeding colonies in Greenland and Iceland, but none to my knowledge exists farther north on the mainland of North America.

The earliest spring record of Leach's Petrel in the Bay of Fundy which I have been able to find is May 15. There are no indications of any Petrel breeding until the first or second week of June. As the period required to raise the young is more than a hundred days, few Petrels can start their fall migration before November. Indeed, I have records of Petrels in the breeding colonies until the end of December. When I left Kent's Island in September, numbers of Petrels were just beginning their breeding activities. This would indicate that there is a possibility that young Petrels do spend the winter in the burrows, but this fact I have not as yet been able to ascertain.

Food.—The examination of contents of the digestive tract of Petrels showed an oily, orange-colored mass of material. A very distinctive and rancid odor is associated with this food. By vomiting the contents of their stomachs at enemies, they apparently protect themselves to a certain extent. This oily, highly pungent substance is not only disagreeable but tends to temporarily blind an intruder of the nesting bird.

It is not known definitely where Leach's Petrel gleanes the greater part of its food. The refuse matter left by the whales and seals is at least one source. The concentration of Petrels at sea is a good indication that whales are in the vicinity. Detailed examinations of stomach contents also revealed the presence of tiny mollusks. Small transparent squids constituted the most important item of food of the birds examined in the Bay of Fundy. Mr. Ernest Joye, warden of the Keat's Island research station, also reports that he has frequently seen them feeding upon these animals.

¹ Townsend, C. W., Allen, F. H., 1933, Auk, vol. L, p. 427.

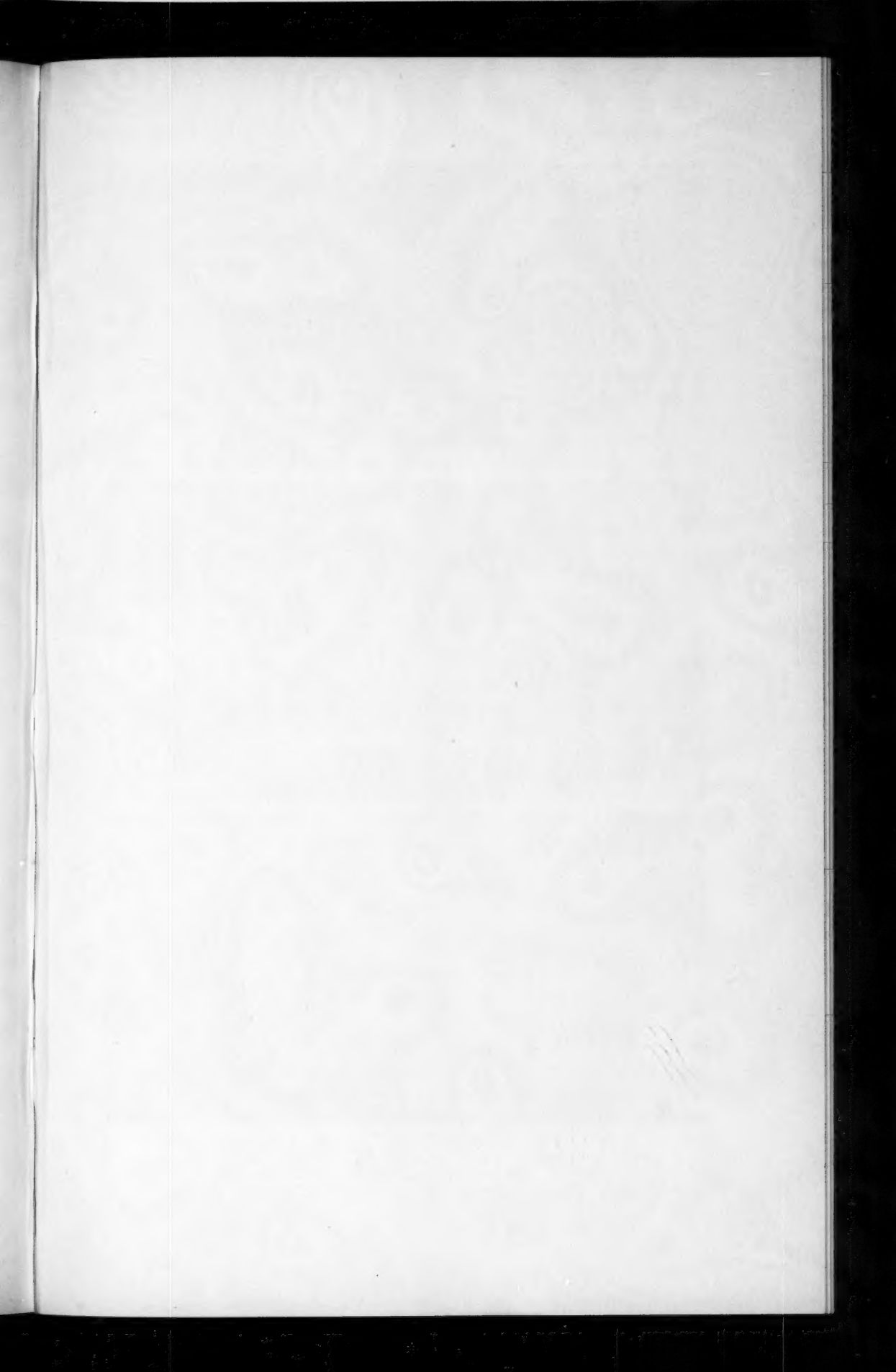
Calls and Notes.—The characteristic call of the Leach's Petrel is different from the notes of any other bird. To the fortunate naturalist who has heard the strange sounds of a Petrel colony this eerie call is unforgettable. The notes have been variously interpreted by different authors, and I shall not attempt to elaborate upon these descriptions. The call is a unique utterance of some eight notes given in an irregular guttural manner. To interpret the song into sounds intelligible to human beings only seems to make the confusion greater. Audubon (1840) describes the call as "*peur wit, peur-wit*" while Charles W. Townsend (1923) records three interpretations: "*ipter-ipta, ut, ut, ut; whipter-ipta, ha, ha, ha; upter-upta, ha, ha, ha.*" Popular interpretations include "*Got any terbacker*" and "*Jonny get your hair cut.*"

I have noticed that incubating birds who show the most aggressiveness towards the person who removes them from their nest utter a certain "squeek-like" note. This note is obviously one of either distress or anger. The bird would utter several of these "squeeks," snap at my fingers with its beak, and then oftentimes break out into the usual full many syllable call.

The adults also utter a note in relation to the young birds. After a youngster has been returned to the nest, the old bird soothes away the chick's mournful peeps with a sort of "choo shoo" which is delivered successively and half-purred.

During the mating performance the pairs of mating birds trill a warm rhythmic series of similar notes. Apparently one bird utters the call and the other joins in as soon as its mate has stopped. The calls sound like "Mmm-mm, mmmmmm-mm, mmmmmm-mm." There is a small break between the main part of the song and the last note. The only time that this humming sound is heard is when two birds are mating together in the burrow. I have never heard these notes uttered from the same burrow more than one night during the whole nesting season. These beautiful contented purrings are one of the most unique things in the whole courtship performance. To walk over the ground where these innocent little wanderers are cooing is one of the greatest thrills experienced in my study of the life history of Leach's Petrel.

Night Activities.—Normally the Petrel is never seen about the land during the daytime. Its going to and from the nest is accomplished under the cover of darkness. This habit has undoubtedly been acquired through evolutionary adaptation as a protection against enemies. So well do the birds realize the danger they run in going to the islands that their activity becomes important only on very foggy nights. After a long day at sea gathering food, they fly in silently with a miraculous sense of direction to their island home although it may be enshrouded with an impenetrable fog. Calling to their mates in their nests beneath the ground, they flutter over the island not unlike a swarm of bats.





UPPER. PETRELS HOVERING IN SEARCH FOR FOOD.

MIDDLE. STUMP PROVIDES PROTECTION FOR BURROWS.

LOWER. FLASHLIGHT PHOTO OF PETREL LEAVING BURROW AT NIGHT.



Excerpts from my journal describing a night's observations of the Petrels on Green Island will serve to convey a conception of this strange night activity. The date was August 24, 1934, the temperature about 45° F., the wind was blowing strongly from the south-east, and the whole night was dominated by occasional downpours and a heavy fog.

"8:40 P. M. (Standard time). Saw first Petrel fluttering over island.

"8:45 P. M. Heard first Petrel call. Others followed and more birds flew in from the sea. They fluttered several times over the island and then disappeared in the shadows. They seemed to be looking for their burrows and ascertaining whether they had reached their own particular island.

"9:00 P. M. Activity has greatly increased. Calls occur frequently and a dozen or more birds are always in the air.

"12:00 Midnight. More calls are coming from the birds in the air. The mating notes of a half-dozen birds can be heard clearly.

"1:00 A. M. Raining very hard. Petrels showing greatest activity of the entire evening. During the flashes of lightning I can clearly make out many birds in the air. Fear of the Gulls has been banished, and the birds are apparently enjoying their freedom from molestation to the utmost.

"4:00 A. M. Activity has steadily dwindled during the last two hours. I have just now heard the last call of a Petrel. Their notes no longer break through the waning storm. Birds can be seen flying out to sea again in ever-increasing numbers.

"4:20 A. M. The last Petrel has left the island and dawn is breaking."

On a night of full moonlight and a clear sky very little Petrel activity is noticeable. The birds fly in from the sea to their nests as quickly and silently as possible. Only an occasional Petrel call and the cry of a Gull's successful capture inform the listener that the birds are active.

The only natural pictures that can be obtained of Leach's Petrel in the daytime are flight pictures at sea. In order to photograph the bird leaving its burrow, intricate apparatus was devised. A "Flashbulb" filled with an illuminating gas and aluminum foil was used for light. By means of electrical magnets a Graflex camera was timed to record a rapid exposure at the moment of the flashlight. The whole mechanism was operated by a delicate switch which the bird closed. This was effected by stretching a thread across the burrow or by using a little metal trigger in the entrance.

The Burrow.—The nesting burrow of Leach's Petrel is one of the most unique characteristics of its breeding habits. They often represent considerable engineering skill and industry. The length of the burrow was in several instances as long as 87 centimeters (34 inches) and 40 centimeters (16 inches) beneath the surface. Burrows are found in diverse situations: in the loam of barren fields, at the base of stumps, under piles of brush, beneath huge boulders, and in banks along the shore. As a rule, the birds

show a tendency to dig under a substantial mass such as a stump or a rock as a protective measure against predatory animals and soil erosion. The burrow generally follows a downward course with numerous sharp right angle turns. In bird banding work we found that by forcing one's bare arm up the tunnel the bird could be removed without seriously injuring the burrow.

The male is responsible for all of the nest building. Seven birds collected in unfinished burrows, obviously in the act of digging, were all of this sex. In the construction of the burrow the bird uses both its bill and feet. The bill serves as a sort of pick to loosen up the wall of loam. The sharp toe nails scrape the dirt aside and the soles of the feet pat it down. The nails of the adult are very well developed and many are five millimeters or more in length. Little soil is actually removed from the mouth of the burrow. The ground is loosely packed, and the birds need only to press the earth into a compact mass on the floor of the burrow.

About three days are consumed in building the burrow. During the first evening the site is chosen and the entrance way is constructed. By the end of the second night the burrow is half completed, and the bird will remain at its digging during the following day instead of retreating out to sea. After three days the nest is completed, and the birds are usually found mating that very night.

Little or no material is placed in the nest. A feather and a twig or two generally suffice. One nest, however, contained ten heavy grass stalks about 12 centimeters long, and another had a mass of 56 spruce twigs measuring from one to six centimeters in length. The temperature of unoccupied nests ranged from 40° F. to 65° F. when determined during the middle of the day. Many burrows although containing nesting birds were very cold and damp.

If a bird is disturbed while incubating, it is not uncommon the next day to find the length of the burrow greatly increased, and the egg moved from its former position to the newer nest bowl. Several times the birds broke their egg after having been disturbed. They deserted the burrow for nearly a week and then returned to it. The length of the tunnel was increased, and an egg soon appeared in the remodeled home.

In the following table, the first ten sets of measurements contain at least one extreme figure for that particular measurement. The largest values in the forty burrows recorded are *italicized*; the smallest have been put in parentheses. The length of the burrow is taken from the entrance to the back wall of the cavity. The depth of the nest cavity is the line extending perpendicularly from the surface of the ground to the floor of the cavity. The entrance to the burrow is measured first horizontally and then vertically. The three values under the nest cavity dimensions are length, width, and height respectively.

MEASUREMENTS OF BURROWS

Length of Burrow	Depth of Cavity	Dimensions of Entrance	Dimensions of Cavity
87 cm.	34 cm.	8 × 7 cm.	22 × 14 × 7 cm.
(28)	30	7 × 6.5	13 × 12 × 8
84	40	9.5 × 6.5	15 × 23 × 8
37	(12)	13 × 6	16 × 14 × 15.5
45	18	14 × 6	16 × (3) × 7
56	32	(5.5) × (5.5)	19 × 14 × (6)
50	30	7 × 9	18 × 11 × 8
54	25	5 × 7	25 × 23 × 9
58	16	6 × 5	(11) × 14 × 7
60	20	7 × 4	12 × 17 × 17.5

Average Measurements of Forty Burrows

50.8	25.1	8.2 × 6.5	16.2 × 16.3 × 8.7
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Mating.—To the observer the courtship of Leach's Petrel is a weird performance. Under the cover of darkness the females of the species flutter over the Petrel islands. From the depths of their burrows the males utter the staccato-like call of their clan. From the air the females hear the calls and answer similarly. By calling back and forth, the birds become mutually attracted and finally mate.

During copulation, the mating birds purr a tender love theme which has been hitherto discussed under "Calls and Notes." After the first night of courtship the nest is usually deserted for a day. The following night the female lays the egg. Sometimes two birds apparently misjudge the approach of dawn and are forced to spend the following day in the burrow. The purring is never made during the day time, but at night it is a certain sign of mating birds.

The Egg.—The Petrel has never been known to lay more than one egg in its nest. There is some evidence that a second may be laid if the first is destroyed—an egg removed from one burrow was replaced two weeks later by another. The ground color of the smooth shell is pure white. About one half of the eggs have a band consisting of minute mottled spots of lilac arranged around the larger end. This band is generally between six and seven millimeters wide. The distance from the band's outer edge to the center point of the egg is usually about sixteen millimeters. Sometimes the entire tip of the egg is marked or a small irregular blotch may occur near the end. The lilac color is varied with purplish and reddish tints, but often there are no markings present on the pure white egg.

It is interesting to note that the colored band may be darker or lighter on the inner side of the shell than on the exterior. A band present on one surface of the shell may or may not be discernible on the opposite side.

In most cases the egg soon becomes heavily nest-stained. They are often colored such a dark brown that both the lilac and the white color of the egg are concealed. This discoloration is caused by vegetable juices of the dank, brown soil in which the burrows are constructed.

The measurements of 45 eggs on Green and Kent's Islands averaged 32.6 by 23.7 millimeters and the average weight was 8.8 grams. The six extremes were 35.5 x 24. mm. and 10.3 gm.; (30.8) x 23.5 mm. and 8.4 gm.; 33.5 x 25. mm. and 10.4 gm.; 32.5 x (22.5) mm. and 8.3 gm.; 31. x 22.5 mm. and (6.9) gms. Ten eggs chosen at random were used for complete determinations:

No.	Long Diam.	Short Diam.	Weight	Weight of Shell	Volume of Egg	Weight of Embryo
1.	31. mm.	23.5 mm.	7.5 gm.	.5 gm.	8.5 cc.	4.4 gm.
2.	32.8	23.5	7.7	.5	9.5	6.2
3.	31.4	24.4	7.9	.45	10.	5.6
4.	32.	23.8	8.4	.5	9.5	4.7
5.	31.	23.8	8.5	.6	9.5	fresh
6.	31.	23.5	8.5	.6	8.5	3.5
7.	30.8	23.5	8.4	.5	8.4	4.
8.	32.	24.	9.4	.65	9.	.6
9.	35.	24.5	9.5	.55	10.5	
10.	33.	23.5	9.6	.6	9.5	1.6

Determinations are presented in the metric system: millimeters, grams and cubic centimeters.

Incubation.—Both the male and the female share the incubation of the egg. A period of 24 hours or more elapses after the egg is laid before actual incubation commences. By placing a light network of twigs over the burrow entrances and banding the adults, accurate information was secured about the incubation procedure.

Each bird sits on the egg for a period of about 96 consecutive hours. It is then relieved by the mate who incubates for a similar period. During these periods the bird does not leave the nest and the mate does not bring it food nor even enter the burrow. The longest record of this self-imposed fast that I determined was 144 hours.

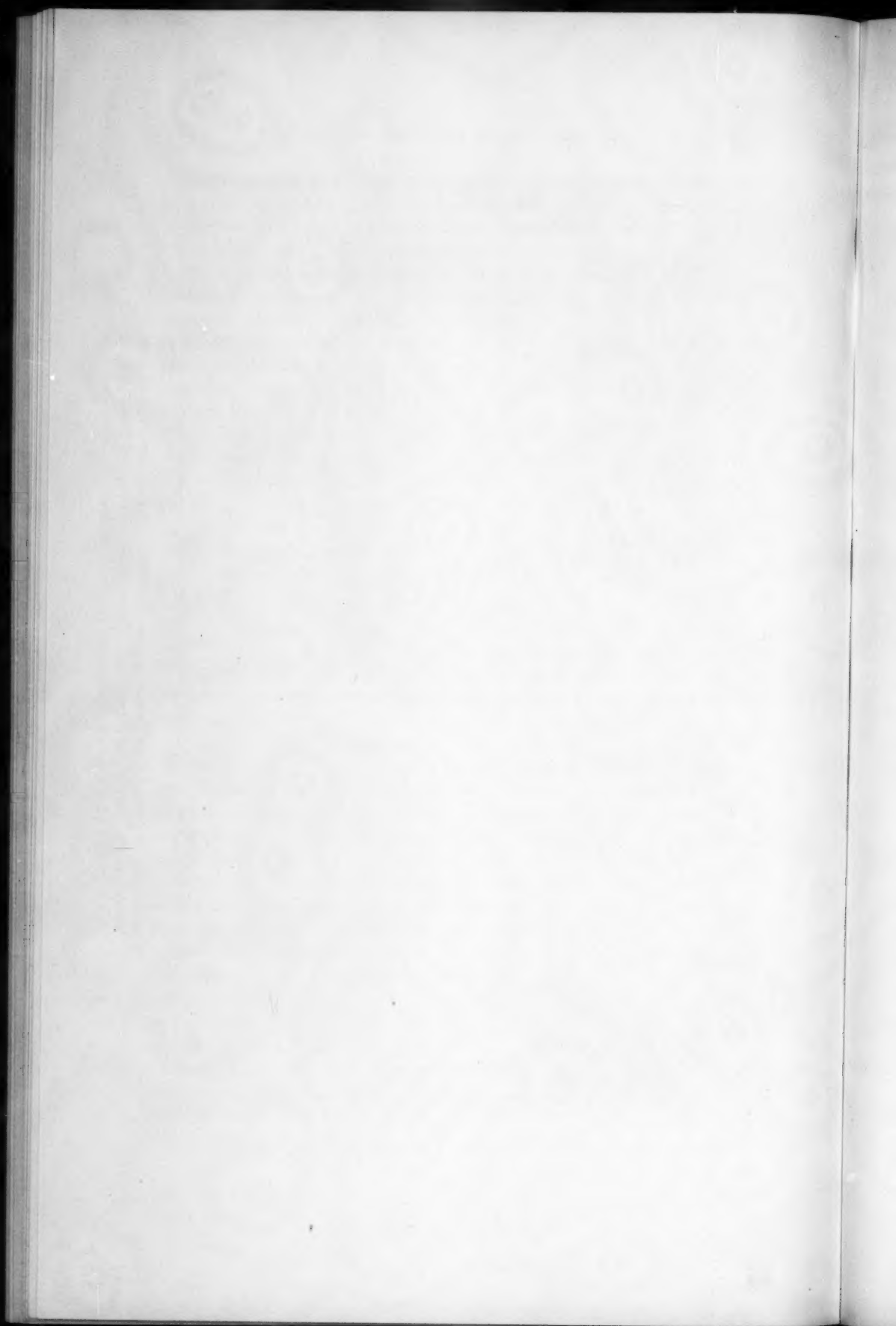
The period of incubation of Leach's Petrel is extremely long. The longest record that I could obtain of continuous incubation was 42 days, but in all probability incubation endures for at least 50 days. This long period has been affirmed by natives who live on the islands where the birds breed. In the instance of the 42 day record I have no evidence of the time when the egg was laid before the nest was recorded. Since the bird lays only one egg, it is extremely difficult to determine when incubation actually starts. If



UPPER LEFT. PETREL CHICK REMOVED FROM PIPPED EGG COMPARED WITH AN EGG.

LOWER LEFT. PETREL 25 DAYS OLD. UPPER RIGHT. PETREL 40 DAYS OLD.

LOWER RIGHT. PETREL 55 DAYS OLD, SEPTEMBER 1, THE MOST ADVANCED CHICK AT THAT DATE.



nests and eggs are examined during the early stages of incubation or mating, the adults invariably desert the nest.

The egg often loses more than two grams or about 20 per cent in weight during incubation. The embryo shows a great tenacity for life. Four eggs which were kept on a table in the laboratory for eight days contained living embryos at the end of this period. During this time the temperature ranged from 45° F. to 85° F. Under actual conditions the egg is often left unincubated by the adults for several days. The parent birds become greatly attached to their egg as the hatching date draws near; I have been able to remove certain individuals from their burrows on three or four consecutive days without desertion occurring. This would be impossible during the first week or so after the egg is laid.

The long incubation period may be correlated with the low temperature and great humidity of the burrow, and to the low body temperature of the adults (106° F.). To be sure the hereditary influence is important but in what way it has played its role we cannot determine.

Although several hundred burrows were examined during the period of greatest hatching, I was not fortunate enough to find an egg in the actual process. A chick can hatch and have dry down within twelve hours at the most. A pipped egg was brought back from Machias Seal Island to the laboratory. It was kept at a warm temperature but failed to hatch probably because of improper control of moisture, after living for several days. During that time the imprisoned chick peeped loudly and vehemently at short intervals and picked away at the shell.

A chart shows daily incubation shifts taken by each adult on the nest: (Symbols "a" and "b" are used to distinguish the two birds "Y" represents presence of chick and "O" symbolizes the absence of the adult bird.) Four burrows from Kent's Island were chosen for the following record. The symbols "N-4, N-14, N-15, N-16" are the record numbers of these particular nests.

Growth.—By the end of August, most of the occupied Petrel burrows contain a young chick. The young Petrels are seldom brooded during the daytime after they are five days old. Occasionally the adult does stay a day or so longer with the young bird. While in the burrow with the young, the old bird is very aggressive toward anyone who attempts to remove the

Date	N-4	N-14	N-15	N-16	Date	N-4	N-14	N-15	N-16
July 25	b				Aug. 1	b	a	a	a
" 26	b				" 2	b	a	a	a
" 27	b				" 3	b	bY	a	a
" 28	b	b	b	b	" 4	b	bY	a	b
" 29	a		b	b	" 5	a	aY		b
" 30	a	a	b	b	" 6	a	bY	b	b
" 31	a	a	a	a	" 7	a	aY	b	b

Date	N-4	N-14	N-15	N-16	Date	N-4	N-14	N-15	N-16
Aug. 8	a	Y	0	b	Aug. 16	Y	Y	O	b
" 9	bY	bY		a	" 17	Daily Records			O
" 10	aY	aY	a	a	" 18	Discontinued			a
" 11	bY	Y	a	a	" 19				a
" 12	Y	Y	a	a	" 20				a
" 13	Y	Y	a	b	" 21				a
" 14	Y	Y	a	b	" 22				b
" 15	Y	Y	a		" 24				O

infant Petrel. It snaps at my fingers and even tries to retain the youngster by pulling on the chick's down with its beak when I drag the chick from the burrow. It is probable that when the chick is 25 to 30 days old both birds visit the burrow each night with food.

Natal Plumage.—This discussion of the tracts of natal down is based on an examination of embryos and freshly-hatched young.

A crown tract covers the top of the head extending from the base of the bill to a point slightly posterior to the eyes. The posterior part of the crown is naked and forms a distinct apterium. There is a well defined tract in the region of the nape. The dorsal tract of down begins in the mid-dorsal region of the neck which is separated by a narrow apterium posteriorly. In the region of the rump the two parts of the dorsal tracts are connected to form a very broad tract of down which extends to the extreme posterior end of the body. There are also distinct scapular, alar and femoral tracts.

Examining the bird from a ventral aspect, we note that the chin and throat are naked. The ventral tract begins on the neck and extends to the breast where it divides into two well-defined lateral ventral tracts that extend to the region of the anus. The ventral parts of the wings are naked. The down of a chick when dry completely conceals the aptera.

One Day Old Chick.—The newly-hatched chick is a feeble, helpless, little mite. Its movements show no greater strength than those of the day old passerine birds. It rests its body equally on breast and belly while the bill rests on the ground and supports the head. The only sign of life in this dark ball of down is the chick's constant peeping while being handled.

The one-day old chick has well defined tracts of long, heavy natal down which are 5 or more millimeters in length. This thick down varies from hair brown at the base to a smoke gray at the tips. The longest filaments of the crown are about 13 millimeters in length. The main mass of down on the head is about 7 millimeters long. The shortest down is on the ventral tracts (5 mm.). The back is covered with 17 millimeter filaments and the rump with down 13 millimeters long.

Only 5 millimeters of the bill is tipped with black. The remainder and the skin around the bill is not pigmented. At the age of 6 or 7 days this

region becomes blackened. The eyes of the young bird are tightly closed. The skin of the eye-lids and the naked region around the eyes is gray-blue. The tarsus and feet are light gray or in some instances they are flesh colored. At this stage the veins show conspicuously through the skin of the naked areas.

Five Day Old Chick.—The young Petrel has during the first five days of its existence doubled its weight. It weighs about twelve grams and is quite a sizable bird. It peeps a great deal while being handled and is only quiet when covered, as I often did, with a handkerchief. The eyes are opened only at intervals and are shut up tight when it is placed in the bright light. The feet are unable to support the plump body, and the chick still supports itself on its breast and belly.

Much of the down of the 5-day old bird is considerably longer than at the time of hatching. Except on the ventral tracts where no growth was noticeable, the down has increased its length by several millimeters. On the back and rump this change was most conspicuous. In this region the down of the chick was about 15 millimeters long while at the end of 5 days it is 20 millimeters, but for the most part it has not changed in coloration. This is due to the fact that the young bird is not exposed to sunlight which shows a tendency to fade the natal plumage of other birds which nest in the open. On the down particularly of the femoral tracts a brownish ashy coloration can be distinguished. The inner extremity of the down is almost hair brown while the tips are generally blue-gray slate color.

The mandible is black except for a light ashy gray area on the edge next to the skull. The maxilla is blackened posteriorly to the nares. The latter and the rest of the upper mandible is ashy gray. The feet and legs are blue gray. The skin around the eyes is grayish blue. The outer toenails are ashy pearly gray while the middle nails are nearly black.

Ten Day Old Chick.—The ten day old Petrel chick is able to brace itself on its feet, to turn completely around, and to turn its head meaningly from side to side. Its former complete helplessness is not so evident, and it shows some signs of intelligence. Its peeping is loud and emphatic when it is removed from the burrow where it now dwells alone. Only at night when it receives food, does it ever see its parents.

The bill and the nares are now completely black and the last vestiges of the egg tooth are gone. The toes are a dark gray while the webs are tinted with grayish buff. The tarsus is lighter gray than the toes while the bottom of both toes and tarsus is light steel gray. The toe nails are black with brown tips about half a millimeter long. The only feathers of the juvenal plumage that have made their appearance are in the region of the femoral and dorsal tracts.

Fifteen Day Old Chick.—The young Petrel has not greatly altered its

appearance except in bulk. It weighs more than three times as much as it did at hatching. At this point the rapidly growing wings give an extent that is nearly twice as great as that of the 1-day old bird. The youngster responds more calmly to handling and does not peep so vehemently during the measuring process. The eyes are opened more frequently now and the nestling seems to be able to make out objects in the shade. In the direct sunlight the eye-lids are tightly closed. The color of the toes is becoming darker. The tarsus has a mottled dark and light gray appearance. The brown tips on the toe nails still persist. The chin is still unfeathered as well as the side of the face and eye region. The flesh on the chin is gray flesh color. The down is sooty gray, broken up in places by browns and blues particularly on the crown, back and ventral tracts. The remiges and rectrices have made their appearance and numerous papillae are appearing on the ventral tracts.

Twenty-Five Day Old Petrel.—At this age the tips of the remiges of the juvenal plumage are unsheathed. The tarsus, the foot, and the web are dark gray. Light down on the chin and throat is coming out. Until this time there has been an area of bare skin around the neck and on the chin and face. The tips of the down which still cling to the feathers of the juvenal plumage has faded to a light gray.

The young chick is more at ease now than ever before. It seldom, if ever, utters the familiar peeping of its early days. It holds its head up and takes more notice of the surroundings. When removed from its burrow and placed near the entrance, it will proceed to return to the nest upon its own volition. It cannot support its large bulk with its feet but manages to slide along on its belly with the two small feet pushing on the sides. On a smooth surface where the bird cannot secure a hold, the feet move back and forth uselessly. As far as I know, the chick utters no other sounds or notes than an occasional peep.

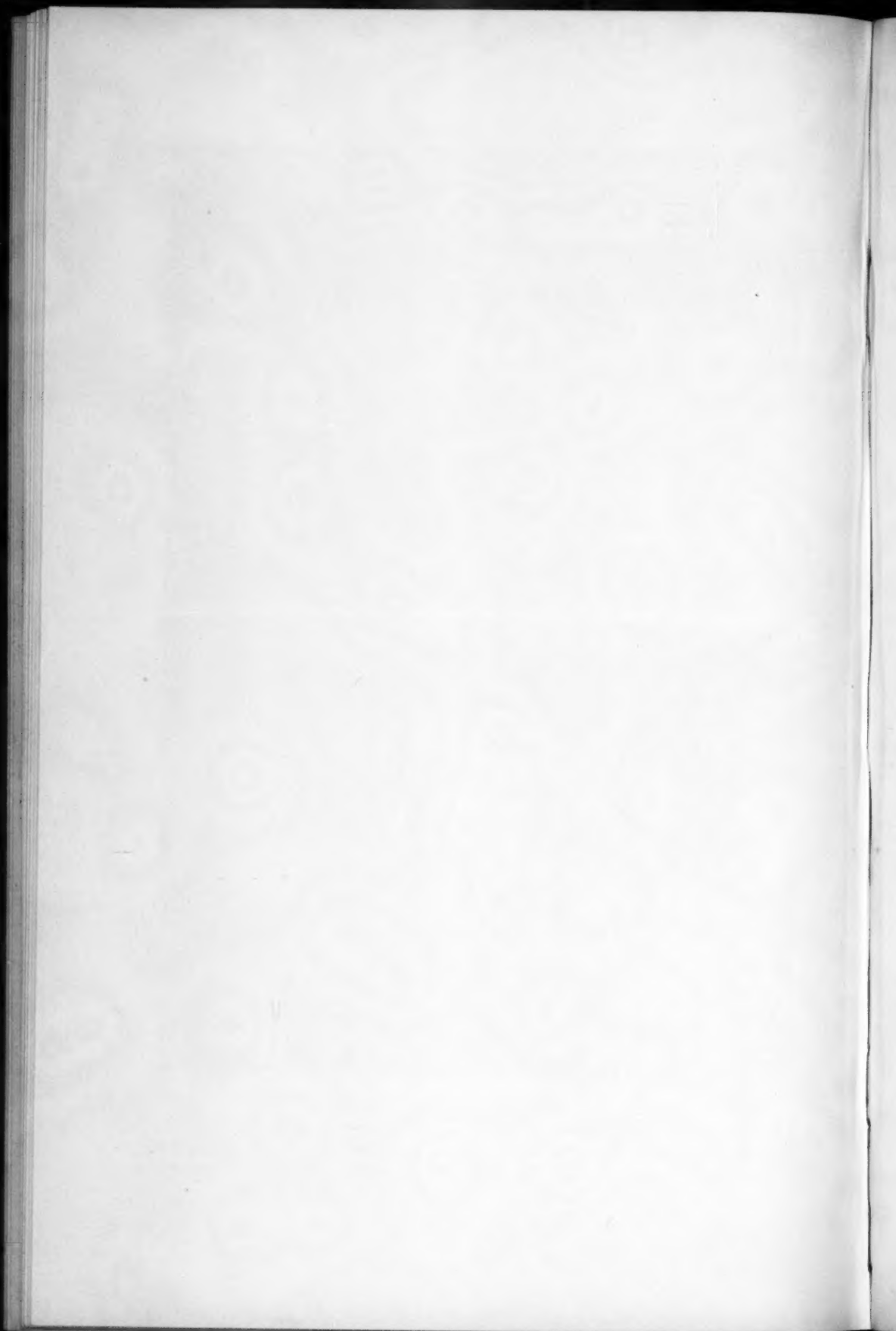
Forty Day Old Petrel.—At this stage the Petrel is very peaceful and takes the measuring routine as a matter of course. It scratches its head with its foot, twitches its tail, and moves its head from side to side keeping its eye on the observer. By making quick, hop-like movements, it can move over the ground quite rapidly.

The 40-day old chick is a very curious looking specimen. The wing and tail feathers protude through the persistent covering of down. The tail, primary, and secondary feathers are black. The wing coverts vary from white on the edges to fuscous near the shaft. The white rump feathers are well advanced and measure 20 millimeters. The down persists on the tips of these feathers and its gray color contrasts with the white. The neck, throat, and cheek are covered with a growth of small juvenal feathers which average about three millimeters in length. The down still remains on the majority of the feathers although little is now left on the wing feathers.



UPPER. STUMP, IN CENTER, WITH FOUR PETREL BURROWS.
NESTS OF HERRING GULL AND AMERICAN EIDER ON EITHER SIDE.
LOWER. THIS BLACK BACKED GULL SWALLOWED FOUR PETRELS IN TWENTY MINUTES.



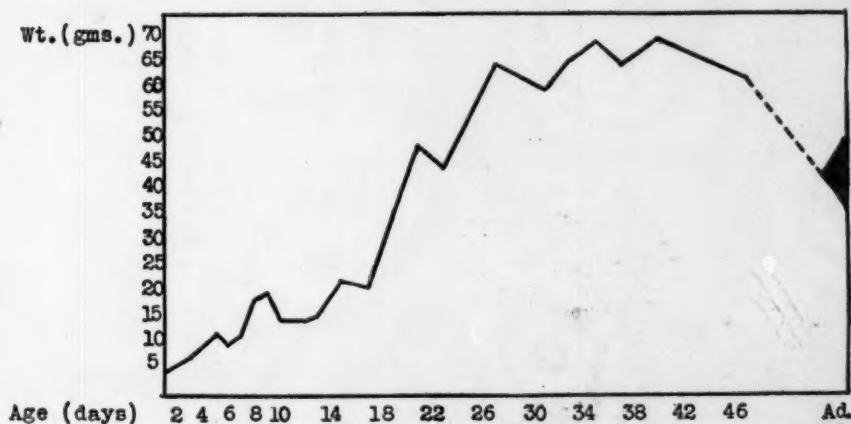


Fifty Day Old Chick.—We left the island during the first week of September and it was impossible to secure further information concerning growth. The most mature bird at this time was a bird 50 days old. Only the wing feathers were well developed. It is probable that this bird would remain several weeks more in the burrow. After the young are about 40 days old, they apparently loose weight gradually until they assume the size of an adult.

This 50-day old Petrel was taken back with the party. It lived for 10 days during which time it lost strength and weight daily. The only food that it received or would take was cod-liver oil. That it survived for 10 days on this diet would intimate that similar material may constitute part of the Petrel's food supply.

The length of time required to raise a young Petrel including the incubation period is about 120 days.

Measurements.—Several tables and a graph have been used to illustrate growth studies. The graph showing the daily weight variations of the young Petrel shows considerable irregularity on the part of the feeding by the adult Petrels. This may be caused to a certain extent upon the conditions of the food supply at sea. Seldom does the chick receive similar meals on consecutive days. The weighings, which were made at 10:00 A. M., are daily for the first ten days and every other day thereafter. A dotted line connects the 46-day old chick's weight to a pyramid representing the limits of weight variation in the adults. Determinations of sixteen adult Petrels showed a range from 37 to 50 grams in individual weights. In the instances of the flanks and the ventral tracts it was impossible to make consecutive time measurements of the same individual feather.



Daily weight variations of the young Petrel.

GROWTH RECORD OF LEACH'S PETREL.—(Cont.)

Age (days)	18	20	22	24	26	28	30	32	34	36	39	45	55
Weight (grams.)	35.	48.5	44.9	57.2	57.9	65.9	62.9	65.5	69.5	65.5	69.5	57.	36.
Length (mm.)	100.	105.	107.	115.	125.	127.	129.	130.	130.5	132.	143.	161.	165.
Extent	116.	125.	144.	195.	230.	248.	257.	268.	285.	295.	324.	365.	389.
Wing	21.	23.	26.5	35.	50.	54.	56.	62.	68.	69.	84.	108.	119.
Tail	4.	5.	7.	11.	13.	15.	17.	21.	24.	30.	39.	54.	62.
	(3.)	(4.)	(4.5)	(5.)	(5.)	(6.5)	(8.)	(9.)	(14.)	(19.)	(23.)	(25.)	(46.)
Bill-Nares	6.8	7.	7.	8.2	8.3	8.6	8.6	8.6	8.6	9.	9.5	10.5	10.5
Bill-Gape	17.7	18.	19.	20.2	20.6	21.	21.5	22.	22.5	23.	24.0	24.0	24.0
Right Tarsus	14.	14.2	16.	20.8	21.6	22.5	23.	24.	24.	24.3	24.5	24.5	24.5
Right Toes (2)	17.	17.6	19.	19.	19.5	19.5	19.6	20.	20.	20.2	20.2	20.6	20.6
" (3)	17.	17.6	19.	23.1	23.2	23.4	23.6	24.	24.5	24.6	25.0	25.5	26.
" (4)	15.5	15.5	18.	22.	22.	22.	22.5	23.	23.5	24.	24.5	24.8	25.5
Right Nails (2)	2.5	2.5	2.7	3.	3.	3.	3.	3.	3.	3.2	3.5	3.8	4.8
" (3)	3.	3.1	3.5	4.	4.	4.	4.	4.	4.2	4.3	4.8	4.8	5.6
" (4)	1.7	1.8	2.	2.2	2.2	2.3	2.3	2.4	2.4	2.5	2.7	2.8	2.9
6th Primary	1.	1.5	2.5	5.5	7.8	11.	14.	17.	21.	24.	37.	67.	77.
			(1.5)	(2.)	(1.8)	(2.)	(3.)	(3.5)	(4.)	(5.)	(14.5)	(43.)	(61.)
6th Secondary	2.5	2.6	7.	13.6	18.	23.8	25.	27.	31.5	33.5	45.	52.	
			(2.5)	(2.6)	(6.)	(12.)	(11.)	(8.)	(16.)	(19.)	(30.)	(41.)	
Flanks	7.5	10.5	13.	21.	19.	19.	19.5	19.5	21.5	25.	31.		
	(5.)	(8.5)	(10.)	(15.)	(15.)	(15.)	(15.)	(13.)	(13.)	(19.)	(23.)		
Ventral Tracts	4.	5.2	9.	10.5	11.	11.	12.	13.	17.	18.	19.	34.	
	(3.8)	(5.)	(6.)	(7.)	(7.)	(7.)	(6.)	(7.)	(9.)	(11.)	(16.)		

Figures in parentheses represent the amount of unsheathing of the feather.

In the table of growth measurements typical feathers and parts of the body were used. Although some variation occurs with different chicks, comparisons with these measurements should enable one to ascertain the age of a young Petrel within a few days.

MEASUREMENTS OF ADULT MALE LEACH'S PETRELS 1934.

Date.....	Jun. 29	Jul. 2	Jul. 10	Jul. 13	Jul. 13	Jul. 25	Aug. 15	Aug. 15
Weight.....	44.5	42.7	44.9	44.7	45.4	46.8	41.7	43.7
Length.....	199.	200.	205.5	198.	200.	205.	204.	205.
Extent.....	460.	455.	441.	460.	460.	455.	475.	470.
Wing.....	151.	157.	150.	157.	157.	157.	159.	155.
Wing-Body..	210.	210.	197.	213.	212.	220.	213.	222.
Tail.....	93.	90.	93.	90.	93.	90.	83.5	85.
M. T. F.....	75.	67.	74.	72.	71.	70.	65.	65.
Bill-Gape...	25.	23.5			26.	25.9	27.	26.5
Bill-Nares...	12.	10.	10.7	10.2	10.	11.2	10.5	11.
Bill-Eye....	31.	30.	29.	29.	28.	31.	28.	29.
R. Tarsus...	26.	23.	22.4	25.	22.5	24.	25.5	24.5
R. Toes (2)..	23.	21.	24.	22.	20.	20.4	21.	21.
(3)..	24.5	25.	26.4	24.	24.	26.		26.3
(4)..	20.	24.	21.	19.	23.	24.		25.
Testes								
Long								
Diam.....	5.6	4.9	4.7	5.	5.6	5.	4.	5.
Short								
Diam.....	4.	3.	3.8	3.5	5.	4.	3.	3.5

MEASUREMENTS OF ADULT FEMALE LEACH'S PETRELS 1934.

Date.....	Jul. 25	Aug. 13	Aug. 13	Aug. 13	Aug. 15	Aug. 15	Aug. 15	Aug. 15
Weight.....	49.4	40.5	44.	47.5	43.5	39.8	39.9	37.
Length.....	206.	214.	204.	203.	207.	213.	205.	204.
Extent.....	470.	464.	464.	458.	479.	480.	477.	472.
Wing.....	156.	161.	163.	155.	159.	169.	162.	159.
Wing-Body..	216.	221.	222.	213.	222.	220.	223.	220.
Tail.....	92.	93.5	83.	88.	84.	91.	91.	84.
M. T. F.....	70.	69.	68.	67.5	68.	64.	68.	63.
Bill-Gape...	26.	26.	25.	29.	26.6	27.	27.	27.5
Bill-Nares...	11.5	11.	10.5	11.4	11.4	10.	10.	10.4
Bill-Eye....	28.	30.5	29.	29.	30.	28.5	28.	27.5
R. Tarsus...	25.	24.	23.	24.5	25.8		24.	23.5
R. Toes (2)..	20.	21.	20.4	20.3	22.	21.	21.5	21.
(3)..	28.	26.5	25.4	27.	27.	26.5	26.	26.
(4)..	25.8	24.	26.	26.	26.	26.	25.	25.
Largest								
Ovum.....	2.	1.5		.4	2.	2.	3.	1.5

The foregoing measurements of adult Leach's Petrels clearly show that there is no difference in size between male and female birds in the long run. The specimens were either birds killed on Kent's Island to determine their sex or individuals picked up dead at the foot of Machias Seal Island light.

Bowdoin Biological Station,

Kent's Island, Bay of Fundy.

TEMPERATURE AND GROWTH STUDIES ON THE
BARN SWALLOW.

BY DAYTON STONER.

FOR THE past several years the writer has conducted a series of observations and banding studies on the Bank Swallow (*Riparia r. riparia*) in the Lake Okoboji region, northwestern Iowa and in the Albany and Oneida Lake regions, New York State. Although these investigations have not been terminated, they have reached a stage where similar inquiries may be profitably undertaken with some closely related species. In so doing interesting comparisons can be made and deductions based on newly discovered items of coincidence or antithesis can be drawn.

Since the Barn Swallow (*Hirundo erythrogaster*) is second only to the Bank Swallow in point of numbers in most parts of New York State, it was chosen as the first subject of our comparative investigations. As with the Bank Swallow these inquiries were concerned with the general activities and nesting habits of the bird. Attention also was given to certain detailed phenomena of its life history and biology with emphasis on matters relating to body temperature and rate of growth.

The present discussion is confined principally to a consideration of young Barn Swallows from the time they hatch until they are ready to leave the nest. The material which serves as the foundation of this account was obtained in the summer of 1934 from the Barn Swallows occupying an old and little used barn located on a small farm near Voorheesville, New York about 13 miles southwest of Albany. A small creek is nearby and a paved highway lies 30 feet from the structure.

Our studies began soon after the Swallows arrived at the barn, about May 1, and continued through July. During this period regular visits to the nesting site were made on Mondays, Wednesdays and Fridays at approximately the same time of day. Thus our records were obtained on alternate days except from Friday to Monday when two days intervened between visits. Mrs. Stoner assisted in collecting the data.

At the time of our first visit several formerly occupied mud domiciles were still attached to the joists 9 to 10 feet above the earth floor of the building. Several pairs of Swallows evidently had nested in this limited space of about 18 by 24 feet during previous seasons so that, within certain limits, this nesting could be termed "colonial." This feature also characterized the 1934 nesting here.

All domiciles constructed in former seasons were numbered and new nests, as rapidly as construction started, also were similarly designated. In this way reference to them could easily be made. The time of deposition

and hatching of the eggs was noted. Since we did not always visit a given nest on the day that the young hatched it was sometimes necessary to estimate the age of the birds in hours. Our previous experience with hundreds of young Bank Swallows was of value in this connection.

With the hatching of each brood, temperature, weight and growth records were begun and continued regularly as above noted. All the young were marked as soon as hatched or shortly thereafter. This was accomplished temporarily through the use of colored strings tied about the neck or tarsus of the nestling. When the birds were five to eight days old, the numbered metal bands furnished by the U. S. Biological Survey were substituted for the strings.

Each time, on arriving at the nesting colony, the domiciles were examined as speedily as possible and the temperatures of all the young birds taken within a few minutes. Numbered columns and designated space for the records and various kinds of data desired were prepared in advance so that no time was lost on the ground. The temperature readings were made with a very sensitive, specially designed, non-self-registering mercury thermometer graduated in two-tenth degree divisions in the Fahrenheit scale. This instrument has an over-all length of 153 mm.; the stem is roundly triangular in cross-section, its greatest diameter 4.5 mm. The bulb is 12 mm. long by 1.5 mm. in diameter. All readings were taken by the interthoracic method. Only a few seconds were required for the registration of each bird's temperature.

As rapidly as the temperatures were taken the nestlings were placed in a small box divided into numbered, cotton-lined compartments. The birds thus could be readily identified for the weighing, measuring and other observations that were to come later.

The weights were taken on a triple beam balance sensitive to one-tenth gram. This balance was installed in a specially designed case to prevent deflection of the beams by any slight breeze. A spirit level attached to the floor of the case aided in promptly adjusting the instrument for use.

Measurements were made with dividers on a steel rule graduated in the metric scale to one-half millimeter divisions.

At first the records for the young occupying each of seven nests were kept separate. All but one of the nest records were complete or nearly complete. Thirty-four different nestlings furnished the data here discussed. Practically complete records were obtained on 26 of these birds while partial records were had from eight others. Of this, latter group the records for two nestlings enter into the picture only once.

Upon completion of the season's work the birds reared in the seven nests were grouped according to age but without regard for family relationship and the information on their temperatures, weights and measurements

arranged in statistical form. In some instances 24 hours or a little more elapsed between the time of hatching of the first and last egg in a nest. As a result of this grouping it was possible to work out a composite arrangement of data based on the precise age of the 34 nestlings. This material serves as the basis for the following considerations.

Weight.—At the time of hatching or within two to four hours thereafter, the weights of young Barn Swallows varied from 1.5 grams to 1.9 grams. The average weight of 31 individuals varying in age from one to 24 hours was 2.39 grams with a minimum weight of 1.5 grams and a maximum of 3.5 grams.

In this connection it may be of interest to note that the 18 Barn Swallow eggs which were weighed averaged 1.9 grams with a maximum of 2.1 grams and a minimum of 1.4 grams. Incidentally, too, the lightest and smallest egg (second clutch) proved to be fertile.

Increase of weight of young was most rapid between the 4th and 10th days. For 18 birds 10 days old the average weight was about 19.5 grams. However, maximum weight (average about 21 grams) was not attained until the 12th day. Thereafter the weight gradually diminished until the time of leaving the nest when it averaged about 17.5 grams. The average weight of the three adult brooding and incubating females captured between June 13 and July 20 was 19.63 grams.

It thus appears that, as in the case of the Bank Swallow, the weight of young Barn Swallows at the time of first leaving the nest averages somewhat less than that of adult birds. However, young individuals attain their maximum weight about a week before attempting initial flight.

Temperature.—Many uncontrollable factors are associated with the mechanics of obtaining bird temperatures by the methods employed in our work. In addition, probably other unsuspected factors have a bearing upon our findings. Therefore, some difficulty is involved in properly evaluating the data. However, the results here reported are well in line with those obtained by other investigators working on other species of birds so that it is believed our records closely reflect the actual circumstances.

For 31 young Barn Swallows varying in age from 1 to 24 hours and all brooded by the adult immediately preceding the taking of the readings, the average temperature was 97.45° Fahr. The minimum reading was 92.0 degrees, the maximum 101.6 degrees. Increase in temperature was most rapid during the first ten days of nest life but the rate of increase was more rapid during the first five days of life than during the succeeding five-day period. The average for 10 five-day old birds was 103.71 degrees while for 18 10-day old individuals it was 105.58 degrees. Readings on 15 17-day old birds gave an average of 107.9 degrees which is about 0.5 degree higher than that of the average for the three adult females whose temperatures were recorded as 107.1, 108.4 and 106.8 degrees, respectively.

Tarsus.—For 16 nestlings varying in age from 1 to 12 hours the average tarsal length was 3.15 mm. For 15 birds varying in age from 13 to 24 hours the average tarsal length was 3.9 mm., while for the entire 31 nestlings falling in the 1- to 24-hour age group the tarsus averaged 3.51 mm. in length.

In 17 young, varying in age from 121 to 145 hours, the average tarsal length was 8.44 mm. with a maximum of 9.50 mm. and a minimum of 7.50 mm. Rate of tarsal growth was most rapid during the first six days of nest life; it diminished markedly between the 6th and 10th days. Maximum length was attained on the 11th to 12th days.

Ulna.—Measurements of the ulna were made as a part of the attempt to record the comparative rate of growth of the various skeletal structures. For seven nestlings varying in age from 1 to 4 hours the average ulnar length was 5.0 mm. with a maximum of 5.5 mm. and a minimum of 4.0 mm. The rate of increase in length was greatest during the first 10 days of nest life, averaging about 2.4 mm. a day. By the 12th day full growth had been acquired, the ulnar length then ranging from 24.0 to 26.0 mm. with an average of 25.35 mm.

Of the two adult females on which this measurement was taken one had an ulnar length of 24.0 mm., the other 24.5 mm.

It will be noted that in the young, ulnar growth is completed or nearly completed at about the same time as the tarsus attains full length. This synchronization of growth in bony structures apparently extends to other parts but our records on this point are not yet sufficiently complete to warrant a definite statement.

Outer Primary.—In some individuals the outer primary first appeared as early as the 4th day. For 10 nestlings five days old the average length of the follicle was 1.3 mm. During the succeeding five days the outer primary in 18 birds attained an average length of 21.66 mm.

The daily growth rate of the outer primary varied considerably. It showed only slight tendency toward uniformity at the same age period not only among the members of a given brood but also among non-related individuals of a specific age group. For example, of a family of five nestlings, individual A might have the longest outer primary one day but 2 or 4 days later individual C or D might rank first in this respect. The greatest difference recorded on any occasion among the several young of any one family was 17 mm. for birds 11 to 12 days old while the greatest difference among the individuals of a given age group but not of the same brood was 16 mm. at 12 and 15 days, respectively.

The actual rate of increase in length of outer primary averaged a little more than 4 mm. a day. For 18 nestlings 15 days old, the average length of the outer primary was 46.11 mm. while the average daily rate of feather

growth between the 10th and 15th days amounted to 4.89 mm. This was the highest growth rate of primary recorded.

Notwithstanding the limited number of records for young in the older age groups, the measurements indicate that the average rate of outer primary growth for birds from 15 to 20 days old also is maintained at more than 4 mm. per diem.

Although the actual *daily* growth rate of the outer primary was not measured on any individual nestling, the growth rate of this structure for a large number of *two-day* periods is available. These records show that the minimum increase in primary length for that time interval was 1.0 mm. for one individual between the 4th and 6th days of its nest life while the maximum two-day increase of 21.5 mm. occurred in another individual of a different family between the 10th and 12th days of its nest life. Other minimum two-day increases in length of outer primary ranged from 1.5 mm. to 3.0 mm. while maximum increases ranged from 12 to 18 mm.

At the time of first flight—17 to 18 days—the outer primary averages about 56 mm. in length; our records show a minimum length at this age of 50.0 mm. and a maximum of 62.0 mm. In the few 20-day old birds that we measured the outer primary averaged 67.6 mm.

The length of the outer primary on the single adult female from which such a measurement is available was 114.5 mm.

In one nestling the vanes of the outer primary emerged from the sheath on the 8th day; in all other individuals the vanes first appeared on the 9th day. While the length of the vane extending beyond the tip of the sheath was subject to considerable variation among birds of a given age group, in general, it increased progressively with the growth of the feather. For example, the average length of the vane beyond the sheath in 10-day old birds was 5.11 mm., in 15-day birds 29.94 mm., and in 17-day individuals 41.86 mm.

Outer Tail-feather.—In a few individuals the outer tail-feathers became evident as early as the 3rd day but in only three nestlings were they as much as 1 mm. in length at four days. However, for 10 5-day old birds the average length was 1.2 mm. During the succeeding five days the outer tail-feather in 18 birds attained an average length of 13.69 mm. And for 18 nestlings 15 days old the average length of the outer tail-feather was 31.41 mm.

In two adult females which were captured the outer tail-feather measured 75.0 mm. and 85.0 mm., respectively.

It will be observed that the outer tail-feather increases in length at a somewhat slower rate than the outer primary averaging only 2.40 mm. per diem for nestlings from the 5th to 10th day after hatching and 3.54 mm. for birds 10 to 15 days old.

Middle Tail-feather.—Only one nestling out of the 21 3-day old birds that were examined showed any trace of the outer tail-feather. However, all 5-day old birds showed development of this feather but its average length in individuals of this age was only 0.95 mm. At six days the average length was 2.11 mm., at 10 days 11.69 mm. and at 15 days 27.52 mm.

Although the outer and middle tail-feathers appeared at about the same time, from the beginning, the rate of growth of the latter lagged a little. This lag was accentuated as the birds grew older with the result that in 17-day young the average difference in length of these two feathers was 5 mm.; at 20 days it had increased to almost 9 mm.

As in the case of the primaries the webs of the rectrices emerged on the 9th day but the rate of emergence thereafter was slower and more irregular than for the webs of the primaries.

In the two adult females available for this measurement the length of the middle tail-feather was 43.0 mm. and 46.5 mm., respectively.

On each of the 19 visits to the barn where these Swallows were reared the air temperature in the building at the level of the domiciles was taken. The lowest temperature recorded here was 70.0° Fahr., the highest 85.5 degrees; average 76.9 degrees.

It was a matter of some speculation and interest as to what influence, if any, a consistently higher air temperature might have on the rate of growth of the young. A limited amount of information on this point was supplied by a family of young occupying a domicile—"Nest 13"—attached to a rafter just beneath a tin roof in a building adjacent to the barn. The lowest air temperature recorded at this nest on any of our eight visits while it contained young was 73.5° Fahr., the highest 97.0 degrees; average 91.5 degrees.

The records of the young reared in Nest 13 are not included in the growth and temperature statistics considered above.

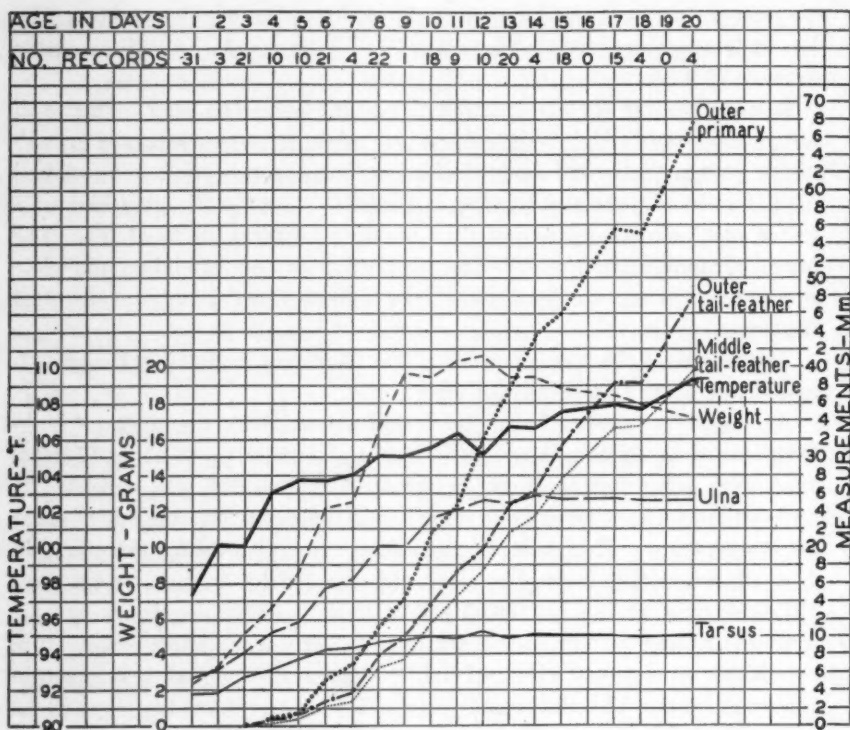
As might be expected, in poikilothermic animals, the average body temperature of nestling Barn Swallows of a given age, up to about 17 days, that were subjected to these higher air temperatures was consistently higher than for nestlings of the same age in domiciles surrounded by lower air temperatures. For example, the average temperature for the young in Nest 13 when they were two days old was 102.15 degrees, at six days 107.42 degrees, at 16 days 109.53 and at 18 days 106.93 degrees.

In the matter of weight the nestlings living under higher temperature conditions consistently averaged lighter than nestlings of the same age in the other nests. This discrepancy varied from 0.4 gram at two days to 4.3 grams at nine days and 4.27 grams at 11 days. Although the young in Nest 13 never attained an average weight of more than 17.76 grams, as the time for leaving the nest approached, their weights declined just as in the birds reared in the other nests.

The rate of growth of the bony structures of the young in Nest 13 was a trifle slower than the average for nestlings reared in the barn. However, maximum size was attained in all birds at the same age period.

Rate of feather growth, as indicated by primaries and rectrices, averaged just a little less among the individuals of Nest 13 than among the young reared in the nests subjected to uniformly lower air temperatures.

The conclusion is reached, therefore, that consistently high air temperature of the surroundings in which young Barn Swallows are reared is reflected in the higher body temperature of the nestlings subjected to it. However, this higher air temperature in no way appears to affect the metabolic activities of the birds by accelerating or stimulating increase in body weight or rate of growth of bony or feather structures. On the contrary, air temperatures that appear to be excessively high affect young Barn Swallows unfavorably, retarding slightly the rate of increase in weight as well as bone and feather growth.



Mean daily rate of increase in temperature, weight and growth of young Barn Swallows occupying seven nests from hatching to time that flight ability was attained. Albany, N. Y., June-July, 1934.

SUMMARY.

In young Barn Swallows increase in temperature is most rapid during the first five days of nestling life; the rate of increase subsides markedly thereafter while the bulk—weight and size—continues at its former or even at a somewhat accelerated rate during the succeeding 5 or 6 days.

The temperature control mechanism apparently becomes established at about the 9th to 10th day when the body temperature of the nestling ceases to respond markedly to fluctuations in air temperature.

Temperature control becomes fairly well established and body weight and measurements approach the maximum before the primary flight feathers acquire their maximum rate of growth. This slowing down of the general growth rate suggests that the bodily metabolism has become fairly well adjusted by the time the rapidly developing feathers begin to call upon the vitality of the young bird. From an evolutionary standpoint this also may indicate the relatively recent acquisition of feathers by the avian class.

Bony growth, as indicated by measurements of ulna and tarsus, is most rapid during the first 9 to 10 days of nestling life. By this time adult or near-adult size of these structures has been attained.

Growth of primaries and rectrices is most marked after the fourth day of nestling life and subsequent to the initial rapid ascent in the temperature curve. While the latter begins to flatten out at about nine days, development of these feathers proceeds as before or even at a somewhat accelerated rate.

The outer primary increases in length more rapidly than the outer tail-feather while the latter in turn grows faster than the inner tail-feather. At the time the bird first leaves the nest the outer rectrix averages about 5 mm. longer than the inner; in birds 20 days after hatching this difference has increased to about 9 mm.

Such rapid growth of these and other contour feathers demands a great amount of energy and vitality. When the situation is analyzed there is little wonder that the weight, temperature and growth curves for other body structures than feathers tend to flatten out while the feather-growth curves rise rapidly (Fig. 1). After the other body structures have developed the metabolism of the bird is, for a time, almost wholly directed toward the production of feathers.

Body and feather growth in young Barn Swallows appear to be affected adversely when the birds are reared in domiciles subjected to excessive heat.

*New York State Museum,
Albany, N. Y.*

THE BIRTH OF A SNIPE FAMILY (*CAPELLA DELICATA*).¹

BY HENRY MOUSLEY.

Plate XXII.

IT WAS late in the afternoon of May 10, 1931, that I found near Lachine, a suburb of Montreal, a nest containing four young Wilson's Snipe just hatched out—a very early date for these parts—and either in this or adjoining fields, a pair (possibly the same pair) of Snipe have since hatched out a brood each year, the last one in 1934 forming the title of the present paper.

The nest composed entirely of dry grasses and well concealed in a large tuft of grass in a rough pasture, was shown to me on May 23, when it contained four eggs far advanced in incubation. Visiting the site for the next few days, I was more than fortunate in arriving on the 26th, just as the first chick was emerging from the shell, this giving me a long looked for opportunity of witnessing the birth of a whole brood, and noting the varying time between the emergence of each chick, as in some cases the whole four may not emerge on the same day. It was not until two and one-half hours later that the second egg was seen to be cracking, by which time chick No. 1 was thoroughly dried out (fig. 1) and able to leave the nest, three pictures showing this event, as well as chick No. 2 in the very wet stage, just after emergence (fig. 2) and also partly dried out (fig. 3), in which stages it cut a very poor figure as compared with chick No 1, now in its fluffy dress of varying shades of brown, the down feathers lightly sprinkled with white at their tips, making a young snipe one of the prettiest objects imaginable. These pictures show also, quite distinctly, the so-called "egg-tooth," a whitish protuberance at the tip of the upper mandible, formed of calcareous salts deposited between the layers of the skin, which drops off soon after hatching, leaving no sign of its former presence. It is by means of this instrument that young birds are able to chip their way out of the shell.

Upon my first arrival at, and all subsequent visits to the nest up to this point, to see how matters were progressing, the male bird had always flushed within a few feet of the nest, but from now onwards to the hatching out of the fourth chick, he was never seen or flushed again, the novelty of the birth of his offspring, apparently, having worn off.

The female when leaving the nest always flushed silently, as did the male, the "scaipe" or "escape" notes never being once uttered, as is invariably

¹ Read by Title at the Fifty-second Stated Meeting of the A. O. U., Chicago, Ill., October 24, 1934.

the case out of the breeding season, whenever the bird rises from the ground on being flushed or put up accidentally. This is important, as most authors fail to point out this usual silence in the breeding season, until the general public have come to look upon the Snipe as always giving vent to the loud harsh "scaipe" notes, whenever they rise from the ground. At this point, it may also be well to mention that the nest lay between two small sheets of water containing beds of cat-tails and rushes, and it was the invariable custom of the female on flushing from her nest, to at first go away in a straight line, then make a half swing round, finally pitching precipitately in one particular spot on the edge of the water, to the east of the nest where, upon alighting, she would give vent to two notes sounding very like "kuk" "kuk" or "chook" "chook." From there, she would approach the nest through the grass unseen by me, as my hiding place was in an opposite direction.

After the hatching of the second chick, an hour and a quarter went by before the emergence of chick No. 3, by which time it was with difficulty that I could persuade chick No. 1 to remain in the nest, it being very hot at the time, making the opening up of the nest—for photographic purposes—a very disturbing element. However, being anxious to obtain a picture of these three youngsters all dried out, and in a quiescent stage, I allowed the mother to brood them for the best part of an hour, hoping by then that they would all have fallen asleep. Fortunately, this proved to be the case, and I was lucky in getting a picture of them all snuggled together before they again woke up. Another two hours now elapsed before the birth of chick No. 4, this making a total of six and one-half hours from the time of my first arrival at the nest, when chick No. 1 was making its debut into the world.

With this fourth arrival my real troubles began, since chick No. 1 absolutely refused to remain in the nest and allow me to get a well "stopped down" picture giving detail. Time and again I replaced him—I am only assuming the sex of course—sometimes covering him for a time with my hand, at others, putting my cap over the whole brood to try and quiet them down, but all to no purpose, for directly my hand or the cap was removed, his "cussedness" made off as fast as his little legs would carry him. Luckily, the others had so far kept pretty quiet, but by now were becoming very fidgety, and I could see that if I was to get any pictures at all of the whole brood, I must act at once, and take a chance with chick No. 1 before it succeeded in getting very far out of the nest. All things considered, I obtained two very fair pictures, one in particular showing the "egg-tooth" on chick No. 3 (fig. 4) even more distinctly than that already seen in the previous picture of chick No. 1, which said chick in these last two pictures, owing to movement, appears a little blurred—as might be expected. It was

now getting late in the afternoon, so I decided to withdraw and allow the mother to brood and dry out chick No. 4 in peace.

Before concluding, however, I would like to draw attention to an interesting and important matter, which can best be indicated, I think, by my quoting from the late Fergus Menteith Ogilvie's 'Field Observations on British Birds,' 1920, where on page 87, he says: "If you watch such a nest you will see that as each chick hatches, the broken fragments of shell are removed at once, and removed to a considerable distance by the parent bird. For the broken egg-shell, with its glistening white inner surface and the remains of the blood-stained membranes, is now very noticeable among the surroundings, and is a source of danger. The chicks that are hatched, leave the nest, and there remains in it only the one unhatched egg with its inmate assiduously hammering away at the confining walls. The point I want especially to draw attention to is the removal of the tell-tale fragments of broken shell, which would almost infallibly catch the eye of any passerby, if they were left in or about the nest." Now it must be remembered that Mr. Ogilvie is speaking of his experience with the European Snipe (*Capella gallinago*), which would seem to differ from that of mine with its near relative out here Wilson's Snipe (*Capella delicata*) judging, not only from the present photographs, but also from several others I have of nests taken in former years, all of which show the presence of the empty egg-shells up to the very last, and this is so with the Woodcock (*Philohela minor*), no attempt so far as I have been able to judge, being made by either of these two ground nesting birds to remove the empty egg-shells, which remark applies equally well to the European Curlew (*Numenius arquatus*). The Redshank (*Totanus totanus*), Dotterel (*Eudromias morinellus*) and Killdeer (*Oxyechus vociferus*) on the other hand, usually, if not always, remove the empty shells. Looking to the fact that the young of so many Limicoline birds leave the nest very soon after hatching, it would hardly seem necessary that the empty egg-shells should be removed by the parents—at all.

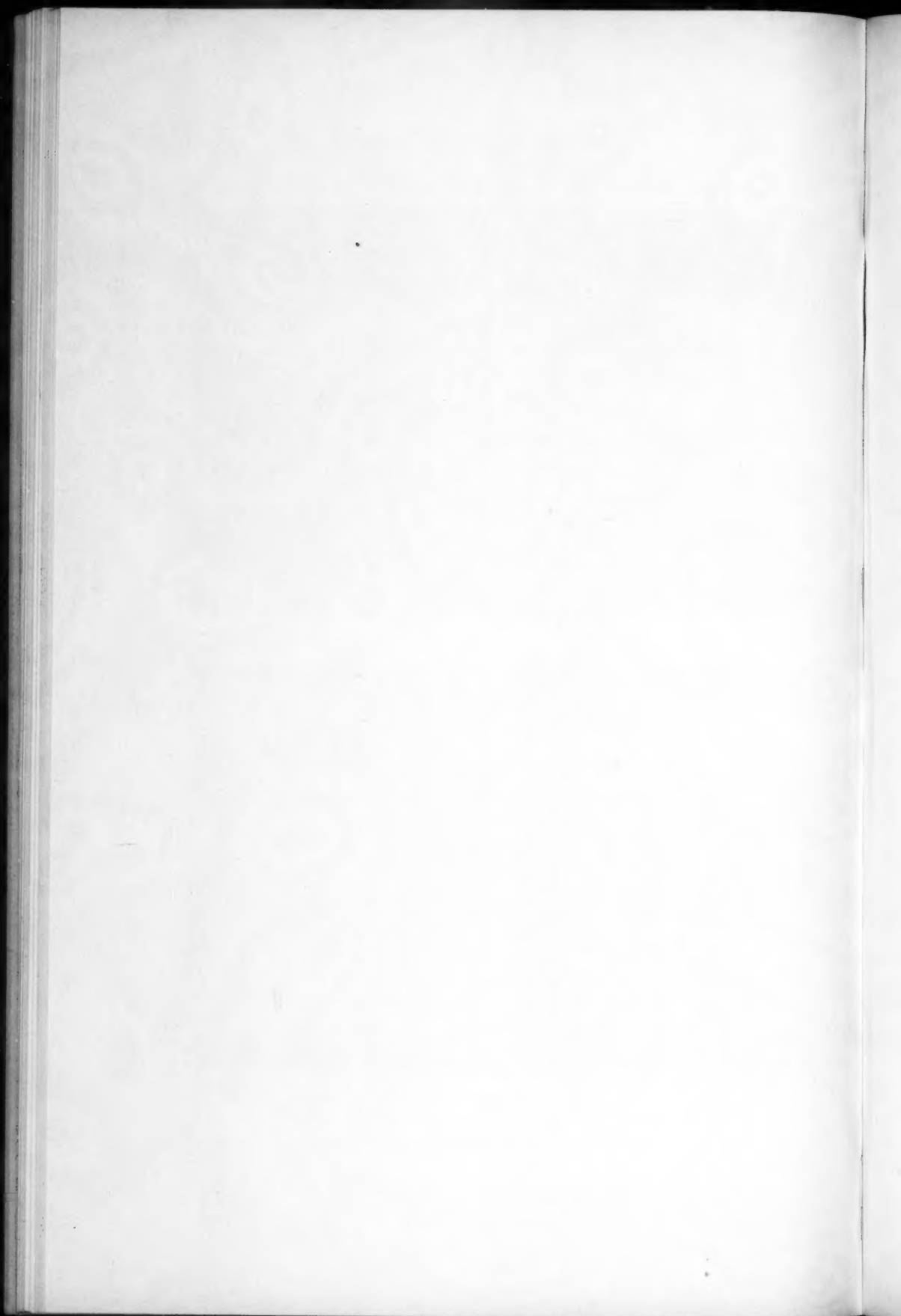
I was glad to find some reference to this matter in Mr. Ogilvie's book, as he is one of the very few authors who has anything to say regarding this interesting but much neglected subject, most people taking it for granted that because a large majority of birds do carry away the empty egg-shells, they must all do so, which is very far from the truth, some birds, at least, eating the shells to save carrying them away.

Even in the case of the European Snipe (*C. gallinago*) the removal of the empty shells does not always hold good as recorded by Mr. Ogilvie, for I find Miss Turner in her 'Broadland Birds,' 1924, gives an instance on Hickling Broad, Norfolk, where no attempt was made to remove the broken shells, she doing that herself eventually. Of this same bird, Miss



HATCHING OF WILSON'S SNIPE.

UPPER LEFT. CHICK NO. 1 TWO AND A HALF HOURS AFTER HATCHING. UPPER RIGHT. NO. 2 JUST HATCHED.
LOWER LEFT. NO. 2 PARTLY DRIED. LOWER RIGHT. NO. 4 JUST EMERGING FROM EGG.



Turner remarks that when she was within three feet of the nest, the old bird flew up from it screaming loudly, whereas, my bird (*C. delicata*) always rose silently—as already mentioned. Again, in 'Bird Haunts in Wild Britain,' 1932, by Winnall and Yeates I find the following on page 68; "One day we went down to get some last studies of the bird and found the eggs hatched. The egg-shells were still in the nest and so we looked about for the chicks. As they were all very close, we decided that they might not yet have strength enough to wander far, so that there was perhaps a chance of our getting pictures of the parent bird brooding them. I accordingly got in the hide, and in a very short time I saw the mother running to and fro in the grass calling excitedly. But she was reluctant to come into the clearing we had made in order to see her, and her plaintive calls soon moved the chicks 'to put their best leg forward,' and so we were deprived of our pictures."

In conclusion, it would be interesting to see a list of those Limicoline birds which usually avoid the general rule of safeguarding the nest and young by the removal of the empty shells.

4073 Tupper Street,
Montreal, Canada.

ADDITIONAL NOTES ON THE PASSENGER PIGEON.

BY ETTA S. WILSON.

INDIVIDUALLY and in flocks the Passenger Pigeon (*Ectopistes migratorius*) was a guileless bird, gentle and timid but not afraid. It could be easily approached in tree or shrub or along the roadway.

Feeding about in small social groups they exhibited the essence of contentment, softly uttering their conversational note, a high-pitched *keek-keek* and bobbing the head in characteristic fashion as they walked or ran about finding food bits, never fighting over the morsel. The quality of the note was slightly husky and there was a preceptible hesitancy as though the individual was a bit out of breath; but the note could rise to a scream when the bird was terrorized. Under torture it was silent.

As they stood their erect attitude was one of great dignity and grace, showing not only their lovely vermilion eyes, the beautiful bluish-slate of the upperparts but the rare pinkish chestnut of the throat and breast. A half-inch fringe of soft white feathers drooped down over the pinkish-red tarsus and was known as the "pigeon's panties."

Doubtless in feeding every form of wild berry and many seeds were eaten. The Leelanau county birds were believed never to go over the water to the mainland or to the southward of their "roost" to feed but to have taken all their food, at least during the nesting season, within the confines of the county, surrounded as it is on three sides by the waters of Lake Michigan and Grand Traverse Bay. Proof of this seems to be found in the fact that although Pigeons were very fond of huckleberries and fed upon them almost exclusively where they were abundant, this type of berry was never found in their stomachs. Huckleberries did not grow in Leelanau county but were plentiful in Grand Traverse county immediately to the south.

A bird killed outright fell from the flock like a plummet but one wounded came down in a long slanting line, some being found quite a distance from the hunter's stand. When the shooting season opened wounded birds were easy to locate on the all but bare ground but when the grass started to grow it was often difficult to find them even when the direction of descent was observed. Usually a wounded bird would lie mute and still until approached by a dog or a person when it might flutter feebly and so disclose its position.

Some birds suffered great lacerations while others seemed to have been killed by a single lead pellet. Legs were seldom damaged except as secondary hurts since in normal flight they were drawn up under the body. Advancing Pigeons received the charge in the face, as only a novice would waste ammunition by firing at a flock after it had passed; so it often happened that many of the victims literally "took it on the chin," their

bills and parts of the head or face shot off or their eyes shot out. Most common were wing injuries which did not kill instantly like body shots.

I believe I began to retrieve Pigeons when I was about three years old since I can remember creeping about in the grass which was so tall in late June that I could scarcely see over it, and I have held in my hands birds still living which had suffered almost every possible forms of mutilation, some gasping for breath, some bleeding silently, some struggling feebly and some lying inert in agony while life's forces ebbed away.

The sale of the birds was regulated by the severity of their injuries. After the most desirable ones were disposed of the remainder, 44 dozen to a barrel, were sold for what they would bring.

Once we had a pet Pigeon, a female which we named "Partie." The bird had come down, slightly injured, and was captured and cared for in our home until its hurts were healed which was about the close of the season for migrating Pigeons. Partie was permitted the liberty of the house and showed great affection for the various members of the family but was particularly partial to my mother to whose shoulder she would fly and remain while mother walked about busy with duties, every now and then reaching up to caress mother's cheek with her slick little head. Partie always slept in an opening among the books on a built-in shelf over a bedroom door, squatted down on her pink feet, and with her head neatly tucked under the broken wing which had mended without permanent disability although a few feathers had been lost. Each day she was furnished with a new bed of soft newspapers.

Traffic in live birds was enormous and profitable. Nets spread over a baited area in old fields would bring in from 700 to 800 birds at one spring of the trap and these live birds brought the highest price. Cooped in poultry crates they could be kept for months with little loss and were mainly purchased by the trap shooting clubs for live targets. The "clay pigeon" is a relic of the time when live birds were used, but live birds were not considered the best kind of a target, except when first caught and still lively. After weeks, and sometimes months of incarceration in limited quarters they became "lazy and logy" and did not fly swiftly from the trap when released. Finally some one with a bright mind conceived the idea of cutting off the toes of the bird when it was placed in the trap. Then when released it went up like a rocket.

Naturally there were no trap shooters in the Pigeon territory but this story was commonly told and believed. Doubtless countless instances of this last unspeakable cruelty brought to an end many individuals of one of God's most gentle and beautiful creatures.

9077 Clarendon Ave., Detroit.

A SPECIMEN OF *TYTO (HELIODILUS) SOUMAGNII*.

BY GLOVER M. ALLEN AND JAMES GREENWAY, JR.

THE MUSEUM of Comparative Zoölogy has recently acquired a specimen of *Tyto soumagnii* (Grandidier). This rare and interesting bird was taken in the neighborhood of Fito, forest of Sianaka, Madagascar, on February 15, 1934. As far as we can ascertain this is the only specimen in this country except for a skin in the Rothschild collection now in the American Museum of Natural History, New York.

At first glance it is placed as a small Barn Owl and closer inspection reveals no character that warrants its retention as a monotypic genus. Milne-Edwards and Grandidier in their great work 'Histoire de Madagascar' observe as follows: "the periophthalmic discs are smaller than those of true *Strix* (= *Tyto*), and, instead of being in the shape of a heart, they are rounded, leaving the forehead more uncovered; their nasal feathers are relatively shorter. The wings do not extend beyond the tail; the third and fourth remiges are subequal and much longer than the first and fifth. In *Strix*, the second and third remiges are subequal and only very little longer than the first, the fourth is much shorter. The tarsi are proportionately a little shorter than those of the barn owl and the toes are stronger."

It is also to be observed that the breast and back in this species are concolor and there is no tinge of gray on the back as there is in the majority of species in the genus *Tyto*.

In this specimen the ruff on the upper breast, which is a continuation of the facial disc, is extended upward to the base of the lower mandible instead of forming a continuous band across the upper breast. This character is not stable among individuals of the same species in the genus. It is possible that this is an age character.

Notes on the skeleton.—The vertebrae and trunk skeleton, together with the humeri and femora accompany the specimen and afford the basis for a few notes additional to those of Milne-Edwards and Grandidier. In the preliminary note by the former (C. R. Acad. Sci. Paris, 85: p. 1282, 1877), it is shown that the skeleton agrees with that of the typical Barn Owls except in its relative proportions, while in the second and final account by Milne-Edwards and Grandidier (Hist. Phys., Nat. et Pol. de Madagascar, Vol. XII: pp. 112–118, pl. 36A–36C, 1879) additional particulars are given and the skeleton as well as the external aspect of the bird is figured. The wings are so reduced that they are shorter than the tail when folded, and proportionately broad, and this diminution is accompanied by a decrease in size of the sternum, while the feet are quite as large as in the Barn Owl of Europe, and the neck vertebrae equally long.

The *vertebrae* comprise thirteen cervicals and six thoracics. In the former, numbers 2, 3, 4, and 5 have short, bluntly pointed neural spines which are much lower and barely evident on the five following, but become again longer on the three terminal ones, increasing in size progressively to become on the succeeding rib-bearing vertebrae, broad in lateral view with their summits extended forward and back in the median line. There is a short ventral keel about two-thirds as high as the neural spine, on the body of the third thoracic. All the thoracic vertebrae are free as they are in *Tyto*. As in Milne-Edwards's specimen, the first two ribs are floating, free distally, the first much shorter than the second. The four succeeding ribs unite by their own sternal ribs, with the sternum, but the next one, number seven, instead of being similarly attached as it is in the European and American Barn Owls, is inserted upon the base of the sternal rib in front, number 6. This difference was pointed out by Milne-Edwards in his specimen, and is no doubt, merely the result of disharmonic shortening of the sternum, forcing the distal attachment of this rib upon the one in advance of it.

The *sternum*, compared with that of the European and American birds, differs in its much reduced size and consequent changes in proportion. Thus the length of its keeled part is about one-third less than in the latter. The triangular antero-external process of the sternum, to which four of the thoracic ribs attach, is equal to that of the European and American Barn Owls in its vertical height as measured from its tip to the coracoid groove, but this dimension in the Madagascan bird is contained but twice in the length of the keel instead of thrice as in the other two skeletons examined representing a European and an American bird; while the rib-bearing portion measures but 10 against 14 mm. in the same birds. The sternum in the Strigidae has its posterior edge distinctly four-notched, with a relatively long postero-lateral process separated by a deep emargination from a shorter process, which again is marked off by a shallower notch between it and the median line. In the Tytonidae, however, the postero-lateral process is shorter, and set off by a relatively shallow indentation, between which and the median line, instead of a distinct process, is a low, rounded convexity, which may be the analogue of the inner of the two processes in the Strigidae. In a European specimen this shorter more median process is practically absent, and in an American example is barely indicated by a slight convexity on either side of the keel posteriorly. The Madagascan sternum is quite like that of *Tyto* in this arrangement, except that the two low convexities are even less noticeable. In side view the keel of the sternum is more undercut than in the northern birds.

The *coracoid* in both is identical in form and structure, except that the external wing-like portion at the base is much narrower, with its outer

corner an obtuse angle instead of nearly a right angle as in the other species. There is in both a minute coracoid perforation on the anterior face of the bone at about two-thirds the distance from base to summit, at the entrance of the wide valley on the inner dorsal third of the bone. Greatest length of coracoid, externally, 32.3, about a millimeter less than in the European bird. The scapula except for its smaller size, 37 against 41.5 mm. in an American skeleton, is the same in both.

The *furculum* is complete and bony in the Tytonidae, in contrast to the condition in the Strigidae in which the distal part becomes cartilaginous. That of the Madagascan bird is quite like that of the European and American *Tyto* in the shape and general conformation of this bone, which is firmly in contact distally with the tip of the keel of the sternum. The proximal ends of the bone are widest and become thin at the articulation with the shoulder.

The *uncinate processes* are long and slender, that on the third thoracic measuring 15 mm. in length. Their sutures along the line of attachment to their respective ribs are still evident in the specimen.

The *synsacrum* in ventral aspect has four cross-struts of bone anterior to the acetabulum, and six posterior to it. The ilia meet the wide crests of the first three neural spines and fuse with them, thus roofing over a canal on either side of the midline. Seen in dorsal aspect, smaller lacunae mark the spaces between the posterior vertebral elements of the synsacrum—in the specimen, six on the right and five on the left side, the anterior ones very minute.

In the Madagascan bird, the distance across the angles at the front of the pelvis is slightly greater than in the European bird examined, but less than in an American skeleton by about 3.5 mm. Possibly the matter of sex accounts for some of the difference. In other respects the pelvic girdle is essentially like that of other related forms of *Tyto*.

Of the limb bones, only the humeri and femora are available, but these agree in the minute details with the same bones of European and American Barn Owls, except for slightly smaller size. Their comparative over-all lengths are:—

	Madagascar	Europe	N. America
Humerus, greatest length,	75 mm.	84	100
Femur, greatest length,	51	53	61

From these comparisons it is clear that *Heliodilus* is nothing more than a dwarf Barn Owl, in which the shortened wings, correlated doubtless with the circumscribed habitat, have required less muscular equipment so that the breast muscles are reduced in size, and the sternum insofar as the portion giving attachment to these muscles is concerned, has become correspondingly

reduced bringing about certain changes in the proportionate development of its parts, and the shifting of the distal attachment of the seventh rib to the sternal rib of the one in front. In a wide view, it is obvious that *Heliodilus* may be regarded as a synonym of *Tyto*, but may be retained by those who place importance on relative lengths of wings and tail, which after all are of quantitative rather than qualitative value.

It would be interesting in this connection to make comparison with the little Barn Owl of Grenada, West Indies, which is a small form.

Museum of Comparative Zoölogy,
Cambridge, Mass.

QUISCALUS QUISCULA IN LOUISIANA.

BY FRANK M. CHAPMAN.

THE ENLIGHTENING series of grackles from Avery Island, southern Louisiana, which Mr. E. A. McIlhenny presented to the American Museum of Natural History some years ago, shows, as I have already reported,¹ that the prevailing form of that region is not the Florida Grackle (*Quiscalus quiscula quiscula* Linn.), but Stone's Grackle (*Quiscalus quiscula stonei* Chapm.). Mr. McIlhenny now sends us an additional lot of birds, collected during the past breeding season, which confirm the identity of the southern Louisiana Grackle and for the first time give us a station on or near the boundary of the breeding range of pure *æneus* in that state. The facts are so definite that they form a valuable contribution to our knowledge of the range and relationships of these birds and, pending further studies, they seem worthy of independent publication.

The birds were collected in May by W. E. Nolan, under Mr. McIlhenny's direction, from the New Orleans region westward to Lake Arthur and northward to Baton Rouge, Bunkie and Boyce. They may be identified as follows: Chef Menteur, 10 miles east of New Orleans, Florida Grackle, 1; intermediate toward *stonei*, 2. Isle Bonne, 10 miles south of New Orleans, Florida Grackle, 1; intermediate towards *stonei*, 2. Morgan City, 65 miles southwest of New Orleans, Florida Grackle, 2; *stonei*, 4; intermediates, 3. Abbeville 60 miles westward of Morgan City, *stonei*, 3, intermediate toward Florida Grackle, 1. Lake Arthur, 35 miles west of Abbeville, *stonei*, 1; intermediate toward Florida Grackle, 1.

Southern Louisiana, therefore, as far as our material goes, is an area of intergradation between the Florida Grackle and Stone's Grackle with the latter increasing in numbers, relatively, as we go westward. We have yet to learn where *æneus* first appears in this direction.

Northward, the first station from which we have specimens is Baton Rouge, on the east bank of the Mississippi, 50 miles north of Morgan City. Eight specimens previously recorded from this locality showed it to be a point of intergradation between *stonei* and *æneus* with the intergrade (*ridgwayi*) as the prevailing form. Mr. Nolan's specimens confirm this condition; four of them are *stonei* and two *ridgwayi*, making the record from this locality stand: *stonei*, 5; *ridgwayi*, 6; intermediate toward *æneus*, 2, *æneus*, 1.

It is evident that we are now nearing the range of *æneus* and from our next station, Bunkie, 70 miles northwest of Baton Rouge and an equal distance north of Abbeville, 8 specimens are pure *æneus* with no trace of

¹ The Auk, Jan. 1935, pp. 26, 27.

that variation which characterizes the bird we have been wont to call the 'Purple' Grackle.

Mr. Nolan continued his explorations to Boyce, 45 miles northwest of Bunkie. Here he secured 10 male and 10 female Grackles, all typical Bronzed Grackles. From this point, if we should continue our journey northward to Great Slave Lake, westward to the Rockies, and southwestward to the valley of the Rio Grande, we should find only Bronzed Grackles. But if we should go from Bunkie to Baton Rouge we should find that within a distance of 70 miles the intergradation of *æneus* with the 'Purple' Grackle is so complete that only one of fourteen birds is typical of the first-named form. Here is food for thought.

The intergradation of these birds within a surprisingly short distance has long been known. But from no other area have we data showing this passage from one form to the other in so narrow an area and so definitely. As far as I am aware, there are no topographic or climatic conditions in the region between Baton Rouge and Bunkie which would account for their intergradation through environmental factors, or explain why their ranges should meet in this area.

As I have stated in an earlier paper on the relations of these birds, the evidence indicates conclusively, to my mind, that they intergrade by hybridization wherever their breeding ranges adjoin, and the product of this hybridization, whether in Louisiana or Long Island, is always *ridgwayi*. These new data support this belief.

But, as I have before remarked, to hybridize, these birds must come together, and to come together they must have been apart. When we find the ranges of the Bronzed and 'Purple' Grackles separated by the Alleghenies we have a topographic reason for existing boundary lines. But there are no mountains between Baton Rouge and Bunkie. Why then should the ranges of these two birds meet there? Why did not *æneus* range farther east or *quiscula* farther west? To answer these questions we should know where each form started from and the conditions controlling its extension of range.

What prevented *æneus* from ranging eastward in southern Louisiana over the route which the Boat-tailed Grackle, for example, has apparently followed? Accepting as a working hypothesis the theory advanced in my recent article ('The Auk,' Jan., 1935, p. 21) that during the last Glacial Period the Purple Grackle was confined to Florida, the obvious answer is because *quiscula*, in its post-glacial range extension, was already in possession of the ground.

Similarly, we may surmise that *stonei* did not extend its range into northern New York and northern New England because *æneus* was already established there.

If, however, it should be said that *stonei*, a geographical representative of the Florida Grackle, normally reaches the northern limit of its range in southern New York and southern New England in the Carolinian Fauna, so also we may say that *æneus* is of southern origin and no better suited to life in northern latitudes than is *quiscula*. Admitting this, the form to arrive first would be the one to occupy the territory.

All of which is speculation, but speculation inspired by such facts as these Louisiana Grackles contribute toward the solution of our problem. Given sufficient contributions of this nature and some day speculation may become interpretation.

*American Museum of Natural History,
New York City.*

NOTES FROM THE STATE OF DURANGO, MEXICO.

BY ALFRED M. BAILEY AND H. B. CONOVER.

Plate XXIII.

DURING the spring of 1931, it was our privilege to spend a few days afield on an inspection trip, in company with our friend Mr. W. F. Ardis, as the guests of Mr. and Mrs. W. E. Brock of Durango, Mexico. We left Brownsville, Texas, by plane and traveled southwest to Torreon, in the interior, and then to the westward about one hundred and forty miles to the city of Durango.

We had not planned on collecting birds but we took a few for identification. As Durango is a highland region, isolated from both coasts, eastern and western forms occur during migration, making sight identifications impossible; so we have omitted scientific names except where verified by specimens. When we feel there is no doubt about our field identification, we use the common name given in the fourth edition of the A. O. U. 'Check-list,' but if in doubt, we do not specify the race; i. e., Mourning Dove instead of Western Mourning Dove.

On March 19 we left the city of Durango with a pack train of horses and mules and followed along the Rio Tunal, a turbulent stream which has cut a steep walled gorge through the mesa to a valley known as the Valle de los Dios, some fifteen miles to the southwest. Two rivers join at this place to form the Rio Tunal,—the Rio Chico which flows from the north and the Rio San Juan from the south. The highlands are grass-covered, providing excellent forage for stock, and the vegetation is typical of such an area. Yuccas, fifteen feet in height, grow upon the rocky slopes, and the many-branched nopals, resembling great prickly pears, are raised for their fruit. Maguey plants are also cultivated.

The region is sparsely populated and we saw only occasional Indians along the trail. Owing to the many revolutions, the people are extremely poor; there is little attempt to cultivate the soil and there are few domestic animals. Birds were numerous along the Rio Tunal, however. Turkey and Black Vultures were observed, and we saw them daily throughout the trip. Mourning Doves were common along the stream, and there were a few White-winged Doves near one of the habitations. Thrashers and Western Mockingbirds were observed among the nopals, and Robins and Chipping Sparrows were common along the hillsides and along the bed of the stream. Beautiful little Vermilion Flycatchers were continually flashing into the air to take flying insects, and several Black Phoebees were noted.

During the day we saw five Belted Kingfishers and their rattling cries were characteristic notes of our night's camping place; three small fellows were tentatively identified as Texan Kingfishers.

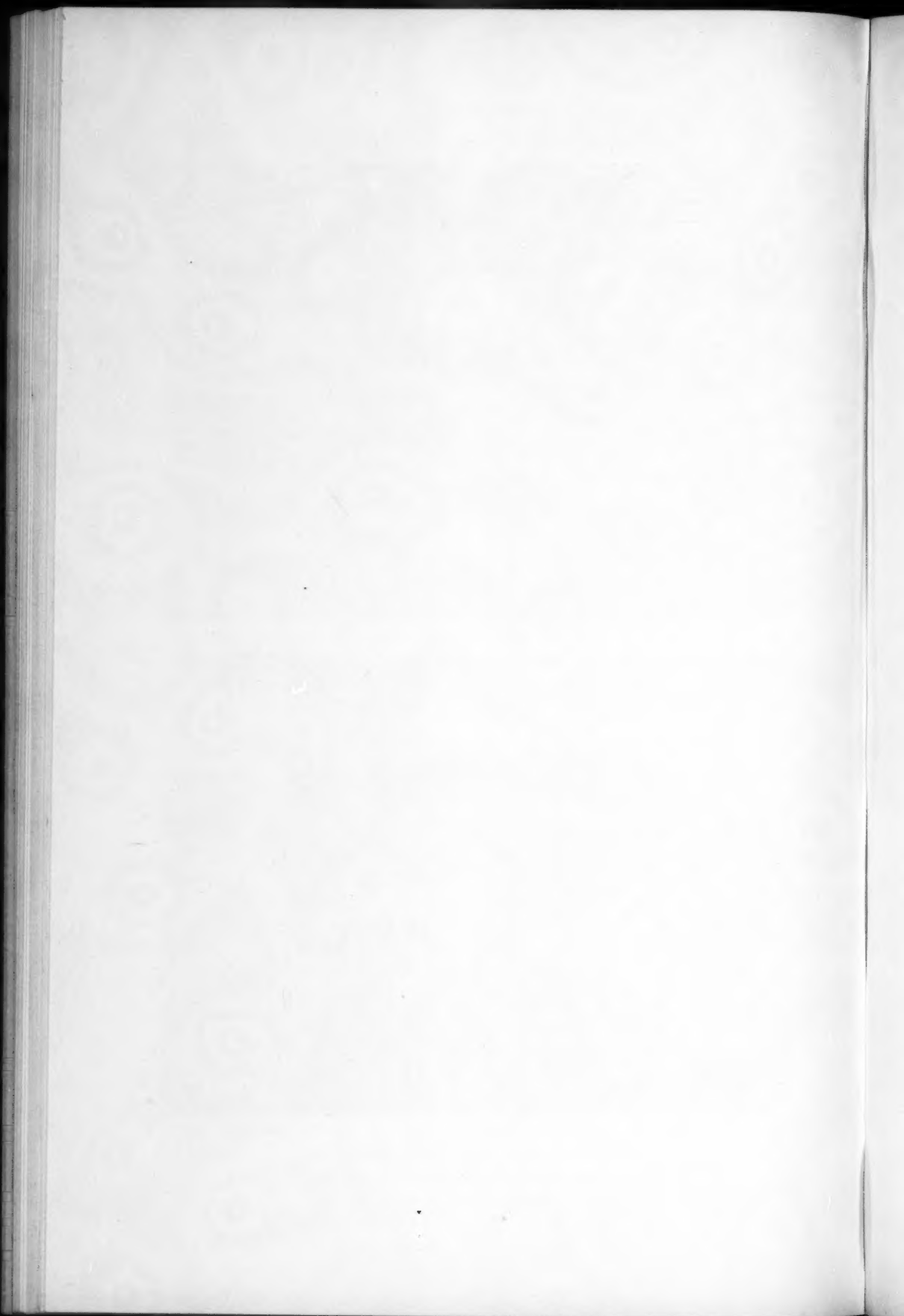
There is a precipitous escarpment along the Rio San Juan, and we found Montezuma Quail (*Cyrtonyx m. montezumae*) in small numbers at an elevation of about seven thousand feet. The first pair we flushed had been feeding upon fallen pine cones. The natives trap these birds and often have them for pets. We traversed some beautiful park land grown with pine, an ideal game country, although small deer were the only mammals we encountered. Birds of prey were not numerous. A few Sparrow Hawks were seen in the open park, and we collected one of several Red-tailed Hawks (*Buteo b. borealis*) observed March 20. A male Goshawk (*Astur a. atricapillus*) was taken the following day in similar looking country as it was attacking an Oaxaca Horned Owl (*Bubo v. melancerus*).

This Owl, an adult male, was submitted to the late Outram Bangs, and he reported as follows: "This specimen is not quite typical. Ridgway gives the form from Durango as *B. v. pallescens* Stone. Your bird is much too dark for that and much too heavily marked with black on upper parts. It is in color just like skins of *melancerus* from Vera Cruz and Guatemala with which I have compared it. It is, however, larger, the wing of your male being 358 mm. In *melancerus*, which is a small form, the wing of the male is 310-320 mm. and of the female 245-255 mm. Perhaps if we had a series from Durango, we should find an intermediate form, large as *pallescens* and dark as *melancerus*."

Our camp for the night was pitched at a place marked La Casita on the map. The next morning we traveled south for about fifteen miles through the picturesque pine forests of a valley known locally as the "Bajia de los coconos"—"The Valley of the Turkeys." Numerous tracks of these fine birds were observed and apparently they were abundant in this particular bit of country. We sent one of our men out for birds and he returned with two large adults, a male and a female. However, he was anxious to aid us in our work and he very carefully picked the birds before coming back to camp! Through the region we found a few Red-shafted Flickers and many Mearn's Woodpeckers (*Balanosphyra f. aculeata*). The latter were going through their mating antics and were extremely noisy. We saw two species of Jays, a long-crested fellow which we failed to identify, and *Aphelocoma sieberi wollweberi*, an extremely common bird in these pine lands southwest of Durango. They are numerous about the camps of the charcoal burners, where, undoubtedly, they secure an easy living. The American Raven (*Corvus corax sinuatus*) was also abundant, and surprisingly tame as they are rarely molested. Robins were particularly numerous along the dry hillside and Chestnut-backed Bluebirds (*Sialia mexicana bairdi*) were seen



UPPER. VIEW IN DURANGO, MEXICO.
LOWER. HAUNT OF THE MASSENA QUAIL.



in small numbers. Here also, was found the Mexican Junco (*J. p. phaeonotus*). It was common throughout the hills above seven thousand feet.

One of the characteristic and picturesque trees of the rocky slopes is the Sad Pine, a species with needles drooping downward. They grow upon hot hillsides in whitish rock, which the natives call "caliche." Our camp that night was near a series of springs, known locally as Cienega Tableterra. In the dried grass of a little marsh we saw many Meadowlarks, but we failed to determine whether they were the Western or Mexican form. Striped Sparrows (*Plagiospiza superciliosa*) were common; in the same marsh were a half dozen or so small dark Buntings, and one was collected (Chicago Acad. of Sciences, 5150). It was submitted to Outram Bangs and, fortunately, he was the one man in the country familiar with the bird, for he had one in the museum collection taken at Bolanos, Jalisco, Mexico, forty-two years before. His specimen had been considered a hybrid by most of the ornithologists to whom it had been submitted, but Mr. Bangs always considered it a new form, and our specimen verified his belief. He described it as a new genus, *Xenospiza baileyi* in the 'Proceedings' of the New England Zoological Club (Vol. xxii, p. 85-88). In life, the birds have the appearance of dark Savannah Sparrows. A few Band-tailed Pigeons were seen near the camp.

We returned to Durango in two days, observing en route two species of Towhees. A specimen of the Spurred (*P. m. montanus*) was taken but it was not typical, although nearer *montanus* than *maculatus* of central and southern Mexico. Small flocks of the Plateau Brown Towhee (*P. f. potosinas*) were encountered on the mesa and along the ridges, but they were not numerous; while over the Canyon of the Rio San Juan, we saw several Vaux's Swifts, possibly twelve White-throated Swifts and three flocks of fifteen to twenty Thick-billed Parrots (*Rhynchopsitta pachyrhyncha*). Their harsh voices could be heard at a great distance. Mr. Brock informed us that they were common at certain seasons when they came to feed upon the pine cones and that he had taken young from cavities in trees.

A few days later, March 29, we traveled northwest from Durango about seventy-five miles to the town of Santiago Papasquiaro and in the following days worked the pine-covered mountains and the lake regions to the southwest.

There were warm springs near the town of Hervideros where we saw a Snowy Egret and many Inca Doves (*Scardafella i. inca*). The latter are numerous about the gardens of Durango.

This lake region, particularly near Patos, south of Santiago, is a great wintering ground of the wild fowl. Here, we were told, the Ducks and Geese wintered "by the millions." The majority of the birds had migrated northward at the time of our visit, but we observed many species, and collected

a few. On the reservoir of Hacienda Magdalena we saw several Mexican Grebes, a Great Blue Heron and several American Egrets. A few Mallards were found in pairs and we flushed many Mexican Ducks (*Anas diazi*). They occurred in small flocks and pairs, and several specimens taken showed signs of breeding. Gadwall, Baldpate, Pintail and Green-winged Teal were seen in numbers, but we observed only a few Cinnamon Teal. Several large bands of Shovellers, about one hundred Lesser Scaups, twenty Buffleheads, and a small band of Red-breasted Mergansers and many Coots were also resting upon the reservoir. Mr. Torres, the owner of the Hacienda, told us that the Little Brown Cranes and Long-billed Curlews were very abundant during the winter. In the same locality we saw several Wilson's Snipe, seven Long-billed Curlew, a Spotted Sandpiper and half a dozen Black-necked Stilts. Mr. Torres stated that the Stilts nested on his property. Marsh Hawks cruised over the majority of the marshes, and just south of Patos we observed a Ferruginous Rough-legged Hawk. Small birds of a few species were abundant in this lake region. We found Yellow-headed Blackbirds in large flocks near some of the villages where they were feeding upon refuse; Sonora Red-wings were found in numbers on Mr. Torres ranch; Brewer's Blackbirds (*Euphagus cyanocephalus*) were common, and Great-tailed Grackles (*Cassidix m. mexicanus*) were exceedingly numerous, many old nests being seen in fruit trees. A few Cowbirds and House Finches were seen about the Hacienda; Say's Phoebes worked the cultivated fields or rested upon fences; a single White-rumped Shrike flushed from a scraggly thorn tree and Horned Larks from the road. Small groups of Violet-green, Barn and Cliff Swallows cruised the marshland in search of insects.

One hundred miles west of Durango, six days journey by mule train, is the town of Mazatlan, at the mouth of the Gulf of California. We made the trip by plane in one hour, our course lying over the rugged Sierra Madre Mountains which rise over 12,000 feet. Two days were spent in the vicinity and we observed many species unfamiliar to us. Among those we recognized were Man-o'-war-birds, Brown Pelicans, Boobies, Chachalacas (*Ortalis wagleri*), Caracaras, Turkey and Black Vultures, Crows, Coots, Lesser Scaups, Ruddy Ducks, White-faced Glossy Ibises, White-winged Doves (*Melopelia asiatica mearnsi*), White-fronted Doves (*Leptotila fulviventris angelica*) and large blue-colored Jays (*Cissolopha beecheyi*).

The Chicago Academy of Sciences,

The Field Museum of Natural History.

STUDIES ON THE PHYTO-VERTICAL DISTRIBUTION OF BIRDS.

BY JOSEPH C. DUNLAVY.

BY DISTRIBUTION is meant the natural geographical range of a species or any other taxonomic group of organisms. The concept of distribution carries with it the implication of parallelism to the surface of the earth. There is, however, another well recognized plane of distribution of animals which is vertical to the surface of the earth. The term *vertical distribution* has become recognized as designating altitudinal distribution over areas of the magnitude of life zones with reference to distance from sea level. Students of bird life have found during comparatively recent years that there is a definite vertical distribution of birds in the vegetation. In order to distinguish this local vertical distribution from the more inclusive zoogeographical term, it is here proposed that the term, *phyto-vertical distribution*, designate the local vertical distribution of birds in any vegetational formation with reference to distance from the topographical floor, i. e. the ground.

It has not been until recently that ecologists have recognized a vertical habitat gradation in the vegetation. Several authors have given some attention to the vegetational levels at which the various types of animals live. The outstanding studies in this field are those of W. C. Allee (*Distribution of Animals in a Tropical Rain Forest with Relation to Environmental Factors, Ecology*, 1926) and A. A. Allen (*Book of Bird Life*, 1930).

Dr. Allee gives the following zones as a classification of the levels to be found in the tropical jungle of the rain-forest type.

- "1. The air above the forest.
2. Tree tops above the main forest roof, 125 or more feet high.
3. Upper forest canopy, 75-100 feet high.
4. Lower tree tops (second story or mid-forest) 40-60 feet high.
5. Small trees, 20-30 feet high.
6. Higher shrubs, 10 feet high.
7. Forest floor.
8. Subterranean."

Dr. Allee does not discuss all the strata given in his classification, nor does he give any criteria for placing the animals into their corresponding zones. Furthermore, he does not take up the mammals or birds. Dr. Allee's classification is a purely botanical one.

Dr. A. A. Allen gives a general classification of bird habitats in wooded areas as follows.

"Birds of the Woodland and Woodland Borders.

- (a) Ground-nesting birds
- (b) Birds of the undergrowth and low bushes.
- (c) Birds of the higher bushes and lower branches.
- (d) Birds of the higher branches and tree tops.
- (e) Birds that nest in holes."

Dr. Allen arranges only birds of the woodland and woodland borders in a phyto-vertical distribution. The criterion for the first and last subdivisions seems to be the nesting site of birds, but the author gives no criteria for the placement of birds in the other zones. Obviously the criteria of that author depend on no single activity of bird behavior.

Dr. R. B. Cowles (1933, unpublished paper) discusses the vegetational habitats of the South African Thorn Bush area in the following way.

"It will be noted that the main vegetational areas are: Bush, Scattered Bush, Edge of Bush, including marginal areas of both types, Shrubby areas, Grass, and Marsh." This of course, is not a vertical classification, but a horizontal one. Dr. Cowles continues below, "There is considerable vertical movement but the birds in the lower areas are seemingly more closely related to their habitat than the tree top forms, and the ground cover forms are still more restricted." The idea of phyto-vertical distribution is presented here with the three zones; "tree top," "intermediate," and "ground cover," given as levels in the vegetation. However, no criterion is given for the relegation of birds to the plant formation.

In our studies in the chaparral it has been found necessary to recognize definite zones, based on the various levels of the vegetation, and to select one or more activities of bird behavior which could be used as indicators of the affinity of a given species to a given zone.

There are three fundamental activities of bird behavior which might serve as criteria for placing them in their corresponding zones; (1) the height at which they feed, (2) the altitude of the nesting site, and (3) the elevation of the place where they would commonly fly for refuge when pursued by an enemy.

The place where a bird feeds is very variable, depending on the quantity and quality of food available in a given place. Feeding is not always an activity that will take place in any definite zone. We may dismiss this criterion as being too variable for our purposes. In fact, zoogeographical literature and observations in animal behavior indicate that spatial changes in the location of the available food supply tend more than any other factor to cause animals to leave their normal habitats and range out into others, (i. e. the sporadic migrations of birds, lemmings, locusts, etc.).

The data on nesting sites has been secured from the literature (Dawson, *Birds of California*, 1923; Wheelock, *Birds of California*, 1920; Hoffmann, *Birds of the Pacific States*, 1927). The site at which a bird places its

nest may be a good indicator of the place at which that species attains greatest security from predators. For this reason the nesting site may be considered a good indicator of the habitat of that species. The level in the vegetational formation which a bird selects as place of refuge may also be considered an indicator of the specific ecological niche of that bird. One element is common to both these criteria—Safety; safety on the one hand for its offspring, exemplified by the choice of the nesting site; and safety on the other hand for itself, exemplified by our criterion of the refuge site.

The area in which the observations here recorded (Table I) were made lies around the campus of the University of California at Los Angeles. The vegetation of this area is typical chaparral; dense brush on the sides and tops of the hills, and low trees and high bushes in the canyon bottoms. This canyon bottom vegetation is composed mainly of willow (*Salix*), live oak (*Quercus*), and sycamore (*Platanus*). The hillside vegetation consists of low bushes such as chamise (*Adenostoma*), wild lilac (*Ceanothus*), sumac (*Rhus*), and many other annuals and perennials. Much of the natural vegetation of the region has been disturbed; however, there is still enough present so that the birds of the original vegetation are still abundant. The least molested parts of the campus are three stream beds and their adjoining areas. Two of these streams continually carry water, while the third, running along the east side of the campus, is characteristically dry. The stream bed on the northwest corner of the campus is characterized by a thick growth of willows, 8 to 10 feet high, and interspersed throughout the district are live oaks and sycamores. The other stream is located on the west boundary of the campus. It was overgrown by thickets of willow near the water, but on the adjoining hillsides the low bush type of vegetation dominates. At the south end of this stream there was a small marsh, with a growth of cattails. This whole interesting ecologic formation has now been destroyed. The canyon that is situated on the east side of the campus is characteristically dry and is covered by the low bush, brushy type of chaparral. A great part of the area is covered with grasses, wild oats (*Avena*), and brome (*Bromus*), with other secondary succession plants. There are also a few areas which have been planted to non-native ornamentals.

We have divided the above vegetational formation into the following phyto-vertical zones:

- A. Ground Zone.—Not exceeding one foot above the ground nor five feet below it.
- B. Low Bush Zone.—One to five feet in altitude.
- C. High Bush Zone.—Five to fifteen feet in altitude.
- D. Low Tree Zone.—Fifteen to forty-five feet high.
- E. Aërial Zone.—Above the substratum, in the air.

There is no high tree zone in this area, the highest trees are the sycamores which reach a height of forty-five feet in this vicinity. The lower branches of the trees and high bushes when overlapping were regarded as being in the zone to whatever altitude they corresponded in terms of feet. For instance, some of the lower branches of the sycamores are in the high bush zone, and similarly there occurs overlapping between high and low bushes, and between the low bush and the ground zone.

The procedure followed in making the observations consisted in one's walking as quietly as possible through the various districts of the area, taking notes as to the zones into which the birds would fly upon the approach of the observer, and if possible to startle a bird by coming up to it unobserved. The ideal method, of course, is to watch to what level a bird will fly when pursued by a Hawk or other enemy. Every opportunity to observe birds under such circumstances was taken.

RESULTS.

TABLE I.

	Nesting Site	Refuge Site	Times Studied	Variations
Lophortyx c. californica.				
VALLEY QUAIL.....	Ground	Ground	73	1
Zenaidura macroura marginella.				
WESTERN MOURNING DOVE.....	High bush	Low tree	42	0
Cathartes aura septentrionalis.				
TURKEY VULTURE.....	Cliffs	Aerial	40	0
Accipiter cooperi. COOPER'S HAWK....	High tree	Aerial	8	0
Buteo borealis calurus. WESTERN				
RED-TAILED HAWK.....	High tree	Aerial	9	0
Falco s. sparverius. AMERICAN				
SPARROW HAWK.....	High tree	Low tree	57	0
Speotyto cunicularia hypugea.				
BURROWING OWL.....	Underground	Ground	15	0
Geococcyx californianus. ROAD-				
RUNNER.....	Ground	Ground	18	0
Balanosphyra formicivorous bairdi.				
CALIFORNIA WOODPECKER.....	Low tree	Low tree	42	0
Colaptes cafer collaris. RED-SHAFTED				
FLICKER.....	Low tree	Low tree	24	2
Sayornis nigricans. BLACK PHOEBE....	High bush	Low bush	45	12
Otocoris alpestris actia. CALIFORNIA				
HORNED LARK.....	Ground	Ground	30	0
Aphelocoma c. californica.				
CALIFORNIA JAY.....	High bush	High bush	51	8

TABLE I—Continued.

	Nesting Site	Refuge Site	Time Studied	Variations
Molothrus ater obscurus. DWARF				
COWBIRD.....	Low bush (Parasite)	Low bush	19	0
Agelaius phoeniceus. RED-WINGED				
BLACKBIRD.....	Low bush	Low bush	20	0
Sturnella neglecta. WESTERN				
MEADOWLARK.....	Ground	Ground	81	5
Carpodacus mexicanus frontalis.				
CALIFORNIA LINNET (House Finch)....	Variable	High bush	76	24
Spinus tristis salicamans. WILLOW				
GOLDFINCH.....	High bush	High bush	15	0
Spinus psaltria hesperophilus.				
GREEN-BACKED GOLDFINCH.....	High bush	High bush	22	5
Zonotrichia l. leucophrys. WHITE- CROWNED SPARROW.....	Low bush	Ground	29	6
Zonotrichia coronata. GOLDEN- CROWNED SPARROW.....	—	Low bush	6	0
Melospiza melodia. SONG SPARROW....	Low bush	Low bush	83	13
Passerella iliaca. FOX SPARROW.....	Ground	Ground	65	8
Pipilo crissalis senicula. ANTHONY'S				
BROWN TOWHEE.....	Low bush	Low bush	54	16
Petrochelidon l. lunifrons. CLIFF				
SWALLOW.....	Cliffs	Aerial	35	0
Lanius ludovicianus gambeli.				
CALIFORNIA SHRIKE.....	High bush	High bush	22	0
Dendroica aestiva brewsteri.				
CALIFORNIA YELLOW WARBLER.....	High bush	High bush	18	0
Dendroica a. auduboni. AUDUBON'S				
WARBLER.....	High bush	High bush	40	8
Geothlypis trichas occidentalis.				
TULE YELLOWTHROAT.....	High bush	High bush	18	4
Mimus polyglottos leucopterus.				
WESTERN MOCKINGBIRD.....	High bush	High bush	78	18
Toxostoma r. redivivum. CALIFORNIA				
THRASHER.....	Low bush	Low bush	16	0
Telmatodytes palustris paludicola.				
TULE WREN.....	Low bush	Low bush	13	0
Psaltriparus m. minimus. COAST				
BUSH-TIT.....	High bush	High bush	32	5
Chamaea fasciata henshawi. PALLID				
WREN-TIT.....	Low bush	Low bush	36	5
Polioptila caerulea amoenissima.				
WESTERN GNATCATCHER.....	Low bush	Low bush	26	0
Oxyechus v. vociferus. KILLDEER....	Ground	Aerial	30	0

A total of thirty-six species were under observation; some for the whole period of study, and some for a part of the time. The time it was under observation depended on the status of the particular species in our locality. According to the refuge criterion, of these thirty-six species, seven have been relegated to the ground zone, ten to the low bush zone, ten to the high bush zone, four to the low tree zone, and five to the aerial zone. The column captioned *Variations* in our table indicates the number of times at which a species failed to choose the zone selected by that species the majority of times observed. The bird that was most variable in its choice of a refuge zone was the Linnet (*Carpodacus mexicanus frontalis*). The ratio of its variation was approximately 1 to 3.

By comparison of the columns captioned *Nesting Site* and *Refuge Site* it will be seen how closely the data obtained from the literature on nesting and the data gathered by our own observations agree. If the nesting sites as given by Dawson (1923), Wheelock (1920), and Hoffmann (1927) are any indication of the zone in which a given species of bird thrives, then our data are of some value also in determining the altitude of the true habitat of the species. We find that in the chaparral the zones in which the birds place their nests follow very closely those in which they seek refuge. In some cases the nesting site is more variable as a phyto-vertical distributional indicator than the data on refuge site. For example, the nesting site of the California Jay (*Aphelocoma californica californica*) as given by Wheelock (1920), is "3 to 30 feet" from the ground. From our observations, according to the refuge site criterion, the phyto-vertical distribution of that bird is the High Bush Zone, 5 to 15 feet from the ground. Out of 51 times studied there were ten variations, or times at which the bird did not fly into the high bush zone.

The data from the literature, in many instances, could not be used as it was presented there. It was, therefore, necessary to arrange according to the zones given above. This was easily accomplished, since the authors, in the majority of cases, give the nesting altitude in feet from the ground.

We find that there are more birds in the lower zones because of the dwarfed type of vegetation existing in the area studied. Furthermore, it is much easier to place birds in the lower zones, not only because of the greater facility with which they may be observed, but because they appear more consistent in choosing their refuge zone. The nature of the heights of the vegetational components is such that the upper zones are increasingly wider than those closer to the ground. For that reason birds of the upper zones, according to the refuge criterion, have more available space for flight. For example the Bush Tit (*Psaltiriparus minimus minimus*) has a distributional zone of from five to fifteen feet; while the Meadowlark (*Sturnella neglecta*) has a phyto-vertical distribution of one foot. The nesting data verify the refuge data in both these instances.

There are some birds that do not take refuge by diving into the brush or trying to hide in the vegetation, but when danger approaches they take to the air. Such birds as Swifts, Swallows, Hawks, Eagles, Sea-birds and many others that take refuge from their enemies by long continued flight, cannot be relegated to vegetational zones, but must be assigned to a zone which has no levels. This, obviously, is the Aërial Zone.

There are obviously two omnipresent zones, the ground (or water) and the air. The remaining zones are merely intergrades of these two. In some cases, as in deserts, there may be present only the ground zone, the low bush zone, and the aërial zone. In like manner in a humid transition forest the ground, high tree and aërial may be the only zones present.

The distribution of birds in this phyto-vertical scheme has been shown to be fairly definite and logical; and a bird once relegated to one zone will almost invariably be found there, if present in that locality. This, however, does not imply that the same bird will not be seen elsewhere, for in feeding, singing, or mating, the bird may range widely phyto-vertically, but when safety is required for itself or for its young, the bird seems to display a preference for a certain particular zone, which is characteristic for that species of bird. This, ecologically, may be considered to be its habitat.

SUMMARY.

Phyto-vertical distribution is a term used to designate the vertical distribution of birds in the local vegetation. In our studies in the chaparral, it was found necessary to delimit clear-cut zones based on the vegetational levels, and to establish criteria by which the birds could be assigned to their respective zones. The criterion used in our observations was the height of the place chosen by a bird for refuge in time of danger. We compare this to the altitude of the nesting site (our second criterion). There is a remarkable degree of agreement between the zones chosen for nesting and the zones chosen for refuge by the different species of birds.

We believe that this agreement gives us a clue to the true habitat zone of any particular species, and a basis for a phyto-vertical distribution of birds.

ACKNOWLEDGMENTS.

The author wishes to express his gratitude for the kind direction and suggestions of Dr. R. B. Cowles, and the interest taken by Mr. R. A. Escobar in the writing of this paper.

University of California at Los Angeles.

BLUE AND SNOW GEESE IN EASTERN UNITED STATES
IN THE WINTER OF 1934-35—WITH NOTES ON
THEIR FOOD HABITS.

CLARENCE COTTAM.

THE BLUE GOOSE (*Chen caerulescens*) is unique in its peculiarly restricted distribution and migration. It breeds in the southwestern part of Baffin Island and on Southampton Island and possibly in other parts of the arctic tundra; indeed, a recent but unconfirmed report indicates the discovery of a limited number of birds nesting in the vicinity of Lake Winnipeg, Manitoba. In southward migration it follows a circuitous course from Hudson Bay to the Mississippi Valley and southward to a remarkably restricted zone on the Gulf coast of Louisiana, with the main concentration from the delta of the Mississippi River to Vermilion Bay. In this confined area it is astonishingly abundant. It occurs in smaller numbers on the Texas coast as far south as Brownsville.

The southward migration flight seems to be a tremendous one with few or no stopovers. During the southward migration records of occurrence of this species in the Mississippi Valley are comparatively uncommon, indicating that the majority of individuals make a non-stop flight over the United States, traveling steadily on until they reach their chosen winter resort.

These facts have made the bird but little known, even to most ornithologists, and for many years it was regarded as a rare species or possibly only a peculiar color phase of its closest relative, the Snow Goose (*Chen hyperborea*).

In migration the Blue Goose seldom straggles far from its accustomed route down the Mississippi Valley. Until the winter of 1934-35 there were comparatively few records of the species in the East, and a number of the coastal States had no records at all. Since November 1934, however, it has been observed in Massachusetts and in every state from New York southward to Georgia, except Delaware.

MASSACHUSETTS.

The number of records in Massachusetts during November strongly suggests that its occurrence in other New England States has been overlooked. Frederic A. Kennard, Director of the Boston Society of Natural History, and others have written of a Blue Goose shot at the Point Gunning Stand at Plymouth Beach, Plymouth, on November 3, 1934, by Harry A. Bradford. The bird is reported to have come into the stand alone, flying high, and calling and circling over his decoys. It then lit outside the decoys

and swam part way in to the stand, then flew up and passed over the decoys within gun range and was killed and mounted as a specimen.

Joseph A. Hagar, ornithologist of the Massachusetts Department of Conservation, wrote under date of April 2 that on November 6 at Harwich, Cape Cod, a single adult Blue Goose came to live with Black Duck decoys at Grass Pond and was shot by Hilary Leclair. The bird was eaten, but its head and wings were retained as convincing evidence of its identity. Mr. Hagar further reports that early in November three of these birds stayed several days with the Canada Goose decoys of F. B. Magathlin, in Sachacha Pond, Nantucket Island. They then disappeared for a day or two and finally one came back alone. This bird refused to leave the decoys and when the latter were removed to winter quarters on Mr. Magathlin's farm about a mile away, it was taken along. The bird, which was immature, was placed with the decoy Canada Geese in an open pen, where it was free to leave at any time. Late in January the State Game Department had the bird taken to the Middlesex Fells Zoo at Stoneham.

In a recent issue of the 'Bulletin' of the Essex County Ornithological Club [No. 16, p. 23, Dec. 1934], S. T. Emilio writes that a fine adult specimen of the Blue Goose was taken at Ipswich on November 10 by Harold Raymond and was mounted. The bird is reported to have been previously wounded. Mr. Emilio states that this was the third specimen known to have been taken in Essex County.

Charles S. Safford, Superintendent of the Plum Island Bird Sanctuary, reports that seven Blue Geese were seen on the island on November 10, although not by him personally. He further states that on this same day some were seen at Rowley and one was shot at Ipswich. This Ipswich record undoubtedly is the same as the one above referred to. On March 17 Mr. Safford wrote that Earl Stanwood, of West Gloucester, observed two of these Geese at a small pond in Essex and collected one of them. The other bird was said to have been seen on several occasions afterwards at this same pond looking for its mate.

Seth A. Low, of the Austin Ornithological Research Station, at North Eastham, has written that on December 9 a lone Blue Goose was captured at Yarmouth, Cape Cod, by Graham Pulsifer. The bird seemed to be nearly exhausted and alighted among a flock of decoys. It was taken to the Ornithological Station, where Mr. Low banded it and placed it with other captive birds until February 15, when it was liberated. During its stay at the banding station it subsisted largely on corn and gained $\frac{1}{2}$ pound during the period of a little more than two months. The bird at first seemed to suffer from cold and would stay inside its sheltered pen during extreme cold weather.

Rumors indicate that a Blue Goose was seen on Marthas Vineyard during the past gunning season, but this record has not been confirmed.

NEW YORK.

From Long Island, State Game Protector Everett R. Overton wrote that William Halsey killed a Blue Goose on Shinecock Bay on November 1, 1934. Two weeks later, November 15, four more were observed on the same bay by a number of persons. Mr. Overton stated that four years ago (November 1930) he observed four Blue Geese on Mecox Bay. It is also reported from several experienced gunners, but without further confirmation, that Dorcy Carter, Everett Talmage, and Samuel Lane each killed a Blue Goose in Shinnecock Bay early in November 1934. An unknown gunner was said to have taken one on Mecox Bay early in December.

Joseph J. Hickey, of the Linnaean Society of New York, wrote under date of February 12 that two flocks of Blue Geese were seen near Moriches Bay, Long Island, on November 8 and 9. The largest of these contained nine birds. Mr. Hickey further stated that sportsmen reported two immature Geese on Shinnecock Bay on November 25, but from the description these might have been either Snow or Blue Geese.

The East Moriches records of November 8 and 9, 1934, are further confirmed by LeRoy and Carlos Wilcox, of Speonk, Long Island. The former reports that on November 1, 1932, a young Blue Goose alighted in a pen with some Canada Geese at East Moriches. The bird was caught and a wing clipped. It was found to be in very poor condition, as were a couple of Canada Geese that came in with it. By January 5 the bird began to molt the feathers of the head and neck, and by the first of April it had attained complete adult plumage. In the meantime the primaries had again grown out, and one day early in May, according to Mr. Wilcox, the bird flew away and was never seen again.

Roy Latham of Orient, Long Island, wrote that he observed a Blue Goose on November 19, 1934, on Little Bay, a small body of water just inside the beach from Gardiners Bay, near Orient. The bird was foraging over the flats most of the day and was not seen after that date.

Mr. Latham assures me further that competent observers noted a specimen on Hooked Pond, East Hampton, on November 10. This bird alighted among a flock of Muscovy Ducks on the pond and fed with them. A local gunner later shot the bird and had it mounted.

A much greater concentration of Blue and Snow Geese is reported in a letter addressed to the writer on March 5 by James Savage, a well-known ornithologist of Buffalo, N. Y. His letter is so graphic that most of it is copied herewith:

"On October 29th, 1934, I was hunting Ring-necked Pheasants with three friends about 10 miles north of Batavia, N. Y. I was looking for a place to cross a drainage ditch to enter a cover of second growth when I heard a call that was new to me and I asked B. Hurd, already in the cover,

to locate the bird. In a couple of minutes another friend, P. V. Bowen, came along and said, 'Jim, there are some of your friends overhead.' Looking up I saw 5 Blue Geese and 1 Snow Goose (probably Lesser) flying about two gun shots away. Which species was calling I could not determine.

"On the same day, October 29, 1934, a flock of several hundred Blue Geese flew over the Transit Road, about 10 miles east of Buffalo and 1 Blue Goose was shot and is now in the Buffalo Museum of Science.

"On October 28th or 29th, 22 Snow Geese and 3 Blue Geese appeared at Schmitt's Muskrat Farm near Alabama, N. Y. The Snow Geese did not remain long but the 3 Blue Geese were there several days and were seen by Harold D. Mitchell, Harlan Eckler, and other members of the Buffalo Ornithological Society.

"Mr. Harold D. Mitchell received a post card from Mr. W. M. Guynes, of Erie, Pa., saying that on October 31st, 1934 he (Guynes) saw in the bay at Presque Isle, 454 Blue Geese, 80 Snow Geese, 28 Whistling Swans and 2 Canada Geese.

"On November 1, 1934, Mr. H. P. O'Shea, manager of the Bank of Montreal at Fort Erie, shot a Snow Goose on Niagara River (Canadian side) about 3 miles north of Fort Erie. This bird was not preserved. It had been previously wounded.

"We have recorded seeing a few Blue Geese before—one or two at a time—but never to my knowledge has there been such a flight of them here as occurred last fall. But the Snow Goose is still more unusual as I never saw it here before in the 50 years I have been observing birds.

"There is also a report that 2 flocks of Snow Geese were seen on some ponds not far from Lyndonville in Orleans County, N. Y., during the week of October 29th."

NEW JERSEY.

Both fall and spring occurrences of the Blue Goose in New Jersey are given. Dr. Witmer Stone (*The Auk*, Vol. 52, pp. 182-183, April 1935) writes that about the end of October an immature bird appeared on a pond at Cold Spring, Cape May County, and joined a flock of Pekin Ducks on a farm. The Goose became tamer as time passed, coming up to the farmer's barn with the Ducks, and was caught in a crab-net and placed in a chicken coop. Later the bird was released.

On November 11 two adult Blue Geese and a Snow Goose were observed by Charles A. Urner and Gerbert Rebell [*ibid.* page 182] standing on the open salt marsh at Tuckerton, Ocean County. Local sportsmen observed these birds on various other occasions several days during that week. Snow Geese commonly occur near the mouth of Delaware Bay in the spring of the year during the northward migration, but are uncommon in this area during the fall.

U. S. Game Management Agent Albert Stadlmeir has furnished convincing evidence that with some 10,000 Snow Geese twenty-five Blue Geese were feeding and resting on Egg Island, Cumberland County during the

last few days of March and the first week of April. He further states that a sportsman of Fortesque killed six Blue Geese during the past gunning season.

DELAWARE.

It is probable that the absence of Blue Goose records in Delaware during the past season represents an absence of competent observers at the appropriate time and places rather than an absence of Blue Geese in the area. U. S. Game Management Agent Albert Stadlmeir gives an unpublished record of a Blue Goose that was wing-clipped by a local gunner, Sam Crowley, on the Indian River late in the fall of 1930. The bird was taken to his home and placed with decoy Canada Geese and kept until its death in the summer of 1934. Several reports were received of a comparatively small number of Snow Geese observed feeding on the salt marsh meadows near Rehoboth Bay and Indian River in November of 1934.

PENNSYLVANIA.

An authentic Pennsylvania record of a Blue Goose is furnished by Dr. F. F. Fish, of Lancaster, who collected and photographed an adult Canada, a Snow, and two Blue Geese on November 8, 1934, on the Susquehanna River in Lancaster County.

MARYLAND.

Several records are available for the Maryland 1934 season. State Game Warden Walter McNamara, of Dorchester County, informed the writer that on November 2 an immature bird appeared on the Little Choptank River. The following day the bird came ashore with a flock of domestic Ducks owned by the warden's sister, but would fly out into the river when anyone approached. The bird was apparently tired and weakened from its long migration, however, for it refused to leave the vicinity and would return to shore to feed with the Ducks when conditions seemed safe. At night the bird went up a little stream 8 or 10 feet wide, to roost with the Ducks; so with the aid of a flashlight and crab net the warden captured the bird. Mr. McNamara still has the Goose which will later be placed at the State Game Farm.

On January 6, Mr. McNamara wrote that for several weeks prior to that date, two Blue Geese had been wintering around a hunting-club goose pen in Dorchester County.

Federal Game Management Agent Orin D. Steele, of the Eastern Shore, reported a Blue Goose killed with a flock of Canada Geese on the Carpenter Farm near Sassafras River, in Kent County. The bird was killed in a stubble grainfield baited heavily with corn. The Blue Goose undoubtedly was attracted by the large flock of Canada Geese that yearly frequent this

farm. Mr. Steele furnished the record of another bird killed at Pope Island, Worcester County. These were taken in the latter part of November and early in December.

Another fine adult specimen, according to three Maryland citizens (James S. Dixon, who mounted it, Robinson C. Walters, and Mr. Steele), was said to have been taken on Bishops Head, Dorchester County, during the first week of December, by Roy Slocum. The specimen, said to be an adult male, is in the Phillip Collection, Cambridge, Md.

A local gunner at Havre de Grace reported seeing four Blue Geese in one flock, during most of one day, on the Susquehanna Flats about the middle of December. None of these were collected and the record could not be confirmed with absolute assurance, although several experienced gunners were reported to have observed the birds.

A farmer living on the Sassafras River informed the writer that two immature birds came to his decoys in the winter of 1932. These were captured and one of the birds is still on his farm, the other one having recently been accidentally killed.

DISTRICT OF COLUMBIA AND VIRGINIA.

One of the most interesting Blue Goose records is that of a single immature bird that, late in October, joined a little flock of 11 introduced, wing-clipped specimens shipped to Washington, D. C., from E. A. McIlhenny's preserve in Louisiana and placed at Roaches Run, Potomac River, on the Mount Vernon Memorial Highway. This bird is at liberty to go and come at will and frequently flies about; but apparently has chosen to be a permanent semi-domesticated pensioner of the National Park Service and to remain an admired specimen in the shadow of our National Capitol.

During the past season a number of Blue Geese chose to winter on the coastal marshes of Virginia and North Carolina. It should be stated, also, that certain coastal islands are important wintering areas for fairly large concentrations of Snow Geese.

A visit was made by the writer on December 31, 1934, to Paramore Island, a longitudinal strip of barrier reef about 10 miles long, situated 5 miles east of the town of Wachapreague. At either end of the island was a large flock of Snow Geese, totaling 8,000 to 10,000 birds. The Geese were merely loafing or "bedding" on the sandy beach and were in compact flocks. The northern flock, numbering possibly 6,000, were in a solid pack, covering an area perhaps 150 to 200 yards by about 40 yards; while those at the southern point of the island were more scattered and more wary of approach. With each flock of Snow Geese were four adults and possibly one or two immature Blue Geese, which held together as a unit within the much larger assemblage. The northern flock was approached five times at

points along the shore and made to fly. Finally the birds rafted at sea about a quarter of a mile offshore. As long as the birds were observed the Blue Geese held together as a compact unit. Three separate groups or divisions of 100 Snow Geese were arbitrarily counted out. In these were 16, 19, and 15, respectively, immature birds, or an average of $16 \frac{2}{3}$ percent immature. The flock scattered somewhat and a unit of perhaps a hundred birds, including the Blue Geese, was observed flying at sea parallel with the traveling car, which was moving at the rate of about 25 miles an hour. The birds were at first in front of the car and when pressed to what appeared to be their maximum speed they were flying at 35 miles an hour. During this time, however, the birds were rising rapidly in elevation. These rates were in marked contrast to those of a passing flock of Sanderlings and Red-backed Sandpipers which cruised at a rate varying from 40 to 45 miles an hour.

The caretaker of the Paramore Island Gun Club informed me that these Snow Geese have been arriving en masse at the island between the first and 10th of November, and would depart the last of February or the first of March. He believed that the migrating birds arrived and left late in the afternoon or night, but have been frequenting this particular island for only the past ten years.

C. O. Handley, of the State Game Commission of Virginia, reports that a few Snow Geese made their appearance in the vicinity of Richmond last fall and that one bird spent the winter with a large flock of Canada Geese at Curles Neck Farm, in Henrico County.

C. H. Harris, of Dogne, reported that on November 8 he killed four Blue Geese in baited waters on his premises in King Georges County. Specimens were not saved and therefore the record cannot be verified.

NORTH CAROLINA.

Coastal North Carolina records of Blue Geese for the past year are numerous. W. E. Crouch and James Silver of the Bureau of Biological Survey, in company with Superintendent Joe Mann of Lake Mattamuskeet Wildlife Refuge, observed five Blue Geese (4 adult and 1 immature) in one flock and two others with a flock of Canada Geese on Mattamuskeet Lake on November 8, 1934. Deputy Game Management Agent E. R. Greene, of the same Bureau, reported seeing one Blue Goose on October 30, in company with a flock of Swans. On November 20 he saw a small flock of seven adults. On January 9, a single bird was seen with Swans; while on March 13 two unaccompanied birds were reported. On this same refuge (Mattamuskeet Lake), Mr. Greene reported one Snow Goose on November 27 and four on December 4.

Superintendent Mann reported seeing one Blue Goose on the refuge on November 17 and stated that gunners killed a bird of this species on the

public shooting grounds some time in November. Federal Game Management Agent William Birsch states that another of these birds was killed at this same place in December of 1933.

State Game Commissioner J. D. Chalk wrote that a number of competent observers reported seeing a small flock of Blue Geese on Currituck Sound early in the gunning season. Specific details, however, were not given.

On January 15, 1935, in company with Federal Game Management Agent William Birsch, the writer observed a flock of approximately 2,000 Snow Geese on Pea Island on the eastern border of Pamlico Sound. With these were six adult and an undetermined number of immature Blue Geese. This island, annually visited by Snow Geese, is the normal southern limit of the Snow Goose range on the Atlantic seaboard.

SOUTH CAROLINA.

According to a letter from Alexander Sprunt, the Blue Goose made its appearance in South Carolina on November 3, when a flock of seven birds was seen at the Clay Hall Plantation, Combahee River. Several reports mention a small flock of birds in this general area, but it is probable that all refer to the same group. On November 10, Mr. Sprunt states that five birds were seen on the Cherokee Plantation, Combahee River, and that these remained for 10 days in the rice fields of this plantation. On November 13, three adults and three juveniles were seen at this place by W. L. McAtee and H. L. Stoddard. It is entirely possible that these birds are the same as those reported on November 3 at the Clay Hall Plantation, as the two places are less than 10 miles apart.

GEORGIA.

The only Georgia record of a Blue Goose collected is that of an immature specimen taken about 1 mile east of Savannah by Ivan R. Tomkins, of the U. S. Dredge *Morgan*. On November 4 he observed another bird in flight at the same locality [The Auk, Vol. 52, p. 78, January 1935]. A previous sight record of three birds made in 1930 constitutes the only earlier published record for this State [The Auk, Vol. 47, p. 577, October 1930].

CAUSE OF COASTAL MIGRATION.

The causes of this unprecedented coastal migration cannot be definitely determined, and it is not improbable that a combination of factors may be responsible. The more probable explanations may be one or more of the following:

(1) Strong north and northwest winds and storms during the birds' migration before they reached the United States, which blew them off their accustomed course.

- (2) Increase in population forcing dispersion.
- (3) Disturbance on the wintering ground resulting in continued migration or wandering.
- (4) Drought along the migratory lane.

Of these factors, the first seems to be the most likely. A report from the Weather Bureau indicates that an unusually severe storm with strong north and northwest winds blew for several days over Central and Eastern Canada and Hudson Bay region between October 25 and November 15, and probably at the very time the birds were in migration over this area. By the first of November this storm had reached the New York City area with an almost record gale of 61 miles an hour.

It is probable that there has been a slight increase in the Blue Goose population during the past two years, causing over-crowding in the established and accustomed wintering grounds. Naturally this would tend to cause the birds to spread out somewhat. Furthermore, drilling for oil, trapping, and reclamation work in many of their principal wintering grounds have been most disturbing during the past few years. Even though this is true, there has apparently been no great migration or abnormal increase in numbers in inland areas adjacent to the Gulf Coast of Louisiana and Texas.

During the northward migration up the Mississippi Valley these birds appeared to be much more common than in the southern flight. Drought conditions, or the drying up of accustomed stopping points in migration, would obviously cause a shifting and compel the birds to go elsewhere. This has occurred, but the birds have not been known to make any great deviation from their accustomed route. Hence, this could in no way explain such a marked deviation during the southward migration.

The numbers and movements of the birds on the Atlantic coast seem actually to have been a migration and a movement of the birds from the north to the south along the coast. Therefore, it seems improbable that the Atlantic-coast birds saw the Louisiana area this year.

FOOD HABITS.

On Paramore Island, in Virginia, and Pea Island, in North Carolina, a number of feeding places were observed where Geese, largely Snow Geese, had been feeding, and all the grasses and sedges in those particular areas were eaten off, mashed flat beneath the surface of the shallow water, or dug up. Feeding seems to be done principally during the early hours of the morning, late in the afternoon, and possibly at night. The birds appeared to feed largely upon the roots of the plants, but subsisted to a lesser extent also upon the exposed green portions. Each Goose apparently excavated a round hole in the mud to a depth necessary to obtain all the roots and rhizomes of a clump. The holes seemed to have been reworked and were so close that they almost touched.

In the areas along the coast where feeding observations were made, marsh grass (*Spartina patens* and *S. alterniflora*), with lesser quantities of salt-grass (*Distichlis spicata*), and rushes (*Scirpus robustus* and *S. species*) were being consumed. Some segments of the alkali-weed (*Salicornia* sp.) also were being taken. Snow Geese are known to feed extensively on this plant in some other parts of the country. In the Bear River Marshes, in Utah, it is one of their most important foods. In a feeding experiment, it was found that while they would take corn or wheat, they seemed to prefer the alkali bush and an assortment of grasses and sedges. On the Texas coast at Laguna Lago, Kleberg County, F. M. Uhler found that they were partial to the green stems, leaves, and seeds of buffalo grass (*Bulbils dactyloides*). After being browsed by the birds the grass had the appearance of having been heavily pastured by cattle. In grain and stubble field severe damage is sometimes inflicted. In the far north the birds are said to feed to some extent on crowberry (*Empetrum nigrum*) and horse-tail (*Equisetum* sp.), as well as on arctic grasses and sedges.

The stomach material available for examination is too meager to allow precise deductions regarding the food of Blue and Snow Geese in the coastal salt-marsh plains. A larger and more representative series would doubtless lessen the apparent percentages now indicated for wild rice, and increase those for other grasses and sedges. The following tables based on stomachs examined in the Biological Survey laboratory will show the present state of our knowledge on the subject:

TABLE 1.—Analysis of the Contents of Stomachs of 19 Snow Geese (Greater and Lesser) taken in widely separated parts of the United States, mostly in November and December.

Constituents	Percent	Constituents	Percent
Gravel (not food).....	42.74	<i>Zizania aquatica</i>	25.00
Vegetable food.....	100.00	Grasses (unidentified).....	28.44
Animal food.....	—	<i>Scirpus americanus</i>	18.75
<i>Equisetum</i> sp.....	22.23	<i>Leguminosae</i>	2.81
<i>Oryza sativa</i>	2.77		

TABLE 2.—Analysis of the Contents of Stomachs of 28 Blue Geese taken in Louisiana during the winter months (greater variety of items than in Table 1).

Constituents	Percent	Constituents	Percent
Gravel (not food).....	30.05	<i>Sparganium eurycarpum</i> ...	0.25
Vegetable food.....	100.00	Cyperaceae (unident.).....	22.19
Animal food.....	(trace)	<i>Oryza sativa</i>02
<i>Carex</i> sp.....	2.79	<i>Triglochin maritima</i>	9.21
<i>Scirpus</i> sp.....	3.75	<i>Spartina glabra</i>	3.92
<i>S. americanus</i>	16.75	<i>Typha</i> sp.....	20.25
<i>S. robustus</i>	10.36	Plant fiber (unident.).....	1.70
<i>Eleocharis</i> sp.....	3.17		
<i>E. palustris</i>	5.64		

U. S. Biological Survey, Washington, D. C.

GENERAL NOTES.

Behavior of the Yellow-billed Tropic-bird.—On June 8, 1935, standing on the northern cliffs of St. Georges Island, Bermuda, where the Yellow-billed Tropic-bird (*Leptophaethon lepturus catesbyi*) breeds, I observed a flight antic of this species which is, so far as I can discover, unrecorded in the literature of any of the Tropic birds. My notes regarding the maneuver, taken on the spot, are as follows:

"I noticed an unusual flight antic of the birds as they flew over the sea. One bird would rapidly overtake another and, getting into position directly over it in full flight, it would bend its tail down so that the long tail feathers seemed to touch the bird below. The latter bird seemed to try to avoid being touched; therefore I saw this antic attempted many more times than I saw it completely carried out."

A. C. Bent in his 'Life Histories of North American Petrels and Pelicans and Their Allies' gives data which establish the date for the second egg-laying of the Yellow-billed Tropic-bird in Bermuda as "late in June." Therefore the date of my observation (June 8) would be such as to allow any of the following explanations of this flight antic:

1. The antic may be an aerial transfer of food from parent to young of the first breeding. That this is unlikely is attested to by the fact that the birds I saw appeared to be in full adult plumage (unmottled, long tails). Bent states that the fully adult plumage is "probably acquired by the end of the first year," but he is not certain of this. Furthermore the young are reputed to be inexpert flyers for some time after leaving the nest, whereas the antic I am describing embodies the most peerless technique on the part of these consummate flyers. Lastly, my observations, made through binoculars at close range under ideal conditions of light, failed to detect any food transference.

2. The antic may have been a form of courtship display if a new selection of mates is made preparatory to the second breeding. Of this possibility I have been unable to find confirmation.

3. The antic may have been of a directly sexual nature, preparatory to copulation. I am not suggesting that such copulation would take place in mid-air, but rather that sexual excitement might have been aroused by the antic, copulation taking place later in the accustomed medium of Tropic-birds. I can find no reference to the latter question and, unfortunately, did not observe the birds in the act of copulation.

Whatever the correct interpretation of the antic may be, the observation that the long tail feathers are used for personal contact between the birds throws an interesting light on the evolution of these appendages. Whereas one might heretofore have supposed that they were a direct adaptation to the exigencies of graceful and protracted flight, one must now see at least an additional explanation, namely, one based on the process of sexual selection.—C. BROOKE WORTH, 712 Wynnewood Road, Philadelphia, Pa.

The White Pelican (*Pelecanus erythrorhynchos*) on Lake Mattamuskeet Wild Life Refuge (Hyde County) N. C.—On June 16 the writer's attention was attracted to a large bird soaring above the New Holland Inn in the Lake Mattamuskeet Wild Life Refuge. Focussing 8 x glasses on it the form and colors showed it to be a wandering White Pelican. It stayed above the Refuge for quite a while finally coming down toward the lake and disappearing from view. Pearson, Brimley and Brimley in 'Birds of North Carolina' give only three definite records for the state up to the time that admirable book was published. There are probably others

since then but as the bird is rare in the eastern states and a view of it a welcome and inspiring sight it is thought best to record its occurrence in this Federal Refuge.—EARLE R. GREENE, *U. S. Biological Survey, New Holland, N. C.*

Brewster's Egret at Grand Canyon National Park.—One of the most interesting and important bird records obtained at Grand Canyon National Park in recent months was reported on April 23. On that date an Egret was observed near the Kaibab Suspension Bridge which spans the Colorado River. On May 18 five Egrets were seen in the same locality.

According to the 'Check-List of North American Birds' (fourth edition), these Egrets were undoubtedly *Egretta thula brewsteri*. A careful check of bird records from Arizona reveals that the occurrence of the Brewster's Egret is exceedingly rare. In 'A Distributional List of the Birds of Arizona' by Harry S. Swarth, published in 1914, is found the following statement:

"There are but two instances of the occurrence of this species in Arizona: Coues (1866, p. 263) observed it on the Colorado River between Forts Mohave and Yuma in September, and Scott (1866, p. 385) reports a flock of five seen, one of which was secured, near Tucson, in May." (Listed by Swarth as *Egretta candidissima candidissima*).

Mr. Lyndon L. Hargrave, Curator of Ornithology at the Museum of Northern Arizona, reported that a Brewster's Egret was taken at Turkey Tanks, near the San Francisco Peaks, in April, 1932, and that two were taken at Tempo in April, 1933.

The above references are all that the writer has been able to discover regarding the occurrence of this species in Arizona.—RUSSELL K. GRATER, *Assistant Wildlife Technician, Grand Canyon National Park, Arizona.*

Increase of the Roseate Spoonbill on the Coast of Texas.—In 'The Auk,' vol. LII, page 77, Mr. Robert P. Allen, of the National Association of Audubon Societies, gives a census of the Roseate Spoonbills (*Ajaia ajaja*) observed by him in Florida and on the coast of Texas, in 1934, giving a total of 879 individuals for the latter state. In June 1935, the writer, in his capacity of Supervisor of Southern Sanctuaries for the Audubon Asso., made an inspection trip to Texas and covered the identical ground worked by Mr. Allen the previous year. It is interesting to note the comparison of his figures and those of Mr. Allen and it should be a matter of satisfaction to all ornithologists that the increase is as much as it is in a single year.

The locality and count at each is given below:

Vinge'tun Islands, Galveston Bay, 120; First-Chain-of-Islands, Espiritu Santo Bay, 77; Second-Chain-of-Islands, San Antonio Bay, 1120; Dunham Island, Arkansas Bay, 130; Deadman's Island, northern Laguna Madre, 73; Green Island, southern Laguna Madre, 340; Seluria Bayou, Matagorda Bay, 5. These are adult birds and those young which could fly well, and constitute a total of 1865 individuals. This does not include the young birds in two nesting colonies, viz., Vinge'tun and Second-Chain Islands, which totalled 255. The combined total therefore reaches the figure of 2090 birds. The young in these colonies were, most of them, on the verge of flight, and in another few days would have been on the wing. This is an increase of 1211 birds in 1935 as against 1934.—ALEXANDER SPRUNT, JR., *R. F. D. No. 1 Charleston, S. C.*

Blue Goose and Glaucous Gull in North Carolina.—On February 23, 1935, an adult female Blue Goose (*Chen caerulescens*) was received at the Museum, in the flesh. The specimen had been picked up dead on the salt marsh about half a mile inside New River Inlet, Onslow County, on the previous day. Apart from the fact

that most of one side of the head had been eaten away by some predaceous animal, the specimen was in good condition, though the presence of several shot holes in the body indicated the probable cause of the bird's death. Mr. Clarence Cottam's record of the third North Carolina specimen, taken on Lake Mattamuskeet last winter (Auk, July, 1935) would place ours as the fourth record, accompanied by a specimen, from this state.

A Glaucous Gull (*Larus hyperboreus*) was taken in the harbor off Southport, N. C., on March 22, 1935, and reached the Museum, in the flesh, on the following day. It proved to be a female in second year immature plumage. This Gull had been observed off the Southport water-front for a week or more previous to its capture, and it would appear to be the third record, accompanied by a specimen, from North Carolina, one of the other two having been taken in the same immediate locality. As I am unable to find any record of this first Southport specimen in 'The Auk,' the following data are submitted: In a letter to my brother, C. S. Brimley, under date of January 26, 1920, Colonel Wirt Robinson, U. S. A., U. S. Military Academy, West Point, New York, reported the taking of a Glaucous Gull by one of his men near Fort Caswell, N. C., on February 19, 1904, Fort Caswell being situated on the west side of the Cape Fear River mouth and directly across the sound from Southport.—H. H. BRIMLEY, Raleigh, N. C.

New Record for Fulvous Tree Duck in Missouri.—In so far as I can get information, there are but two skins of the Fulvous Tree Duck (*Dendrocyana bicolor helva*) extant which were collected in the state of Missouri. One of these, I believe, is in the Smithsonian Institute and the other was from a bird killed in Marion County by Mr. William Evers of Quincy. This skin was positively identified by O. C. Poling of Quincy and Otto Widman of St. Louis.

On March 3, 1935, occurred one of the worst dust storms in the history of Missouri. Several days later a small boy living near Knox City, Missouri, told me that a peculiar bird had "blown" into his yard during this storm. When he told me it was larger than a Duck and smaller than a Goose, was yellow brown in color and had long legs, I was immediately suspicious. I drove to his farm and found a mature Fulvous Tree Duck trying to fraternize with the Geese, who drove it away and forced it to feed with the Ducks.

I stopped on a second occasion and was able to get within fifteen yards of the bird. I used eight power Goerz binoculars in studying every detail of the bird and there was no doubt of its identity. I called the attention of several other students of birds and in every case the identification corresponded with mine.

As I had no collector's license in Missouri I was unable to collect the bird, from which I should have made a skin and presented it to the museum of the University of Missouri.

At the time of my second visit, the bird took to the air several times when approached too closely, and circled about the barn, landing among the Geese. After a sojourn of nearly three weeks, the Fulvous Tree Duck again took to the air utilizing a strong north wind on its return to the Southland.—T. E. MUSSELMAN, Quincy, Illinois.

A Note on the Turkey Vulture.—On our way to Fredericksburg, Va., on the morning of July 1, 1935, I saw a Turkey Vulture (*Cathartes aura septentrionalis*) feeding on a snake about three feet long, which had been killed by a passing motorist, and which was lying in the middle of the tarvia road.

The approach of our car startled the Vulture, whereupon it flew, with the snake

held in its feet. It carried the long and dangling snake for about twenty feet where the reptile caught in a barbed wire fence and the Vulture lost its hold and left the snake draped over the wire. This is the first time I have ever seen or heard of a Vulture carrying anything—at least of that size. It is true the bird had a very hard time of it.

When I looked back, I saw the Vulture return to the spot on the road where the snake had been, completely ignoring the fact that his breakfast was on the line a few feet off.

Possibly the act of carrying was done on the spur of the moment in the haste to get away from the danger of the automobile, and thus was an unconscious reaction.—GORDON W. JONES, "Ellwood," Wilderness, Va.

The White-tailed Kite in South Carolina.—A peculiar combination of observations made some time ago enables the writer to record the first occurrence of *Elanus leucurus majusculus* in South Carolina. On May 7, 1929, Mr. Edward M. Moore saw and watched for one hour, a bird which was soaring in company with a Swallow-tailed Kite (*Elanoides forficatus*) over his house on Bull's Island, Charleston County. He kept it in sight the entire time, with and without 7 x glasses. The bird varied its elevation from "just above the roof" of the house to a great height in the sky, and he noted time and again, the pure white underparts, the distinct black shoulders and immaculate tail. Mr. Moore is a very careful observer and keeps excellent notes. These I had an opportunity of examining recently on a visit to Bull's Island.

Though a sight record only, it ties up very consistently with an observation made by Mr. E. B. Chamberlain of the Charleston Museum, who, in early May 1929, saw what he considered to be a specimen of this Kite flying high over Youghal Plantation, Charleston County on the mainland. From the brief observation he was able to make, Mr. Chamberlain was convinced of the identity of the bird but said nothing of it because of its rarity and his inability to collect it. The spot where he saw the bird is only a short distance in an airline across the marshes from Bull's Island, and it may well be that this bird and the one seen by Mr. Moore were one and the same. When seen by Mr. Chamberlain, the bird was flying toward the Island. He cannot be certain of the day, but is sure of the month. The writer considers these two observations to warrant the addition of this species to the avifauna of South Carolina.—ALEXANDER SPRUNT, JR., R. F. D. No. 1, Charleston, S. C.

An Unusual Gathering of Marsh Hawks in Central North Carolina.—On January 7, 1935, a local friend of mine supplied me with the following information:

On the previous day, January 6, he, in company with a small party from here, was shooting Quail in Johnston County, which adjoins this county on the south-east. They came to a field in which a few widely-scattered Quail were found, while the air overhead seemed to be filled with Hawks. Believing them to be responsible for the scattering of the Quail and to be still searching for individual members of the covey, my informant hid in a tangle of honeysuckle vines that filled and extended over the sides of a small gully, from which hiding place he killed five Hawks in a few minutes, four of which he brought with him to the Museum. Some of these were observed on the ground, but most of them were either flying around overhead or quartering the field as if in search of prey. My informant's estimate of the number of Hawks in evidence was seventy-five.

All of the four submitted proved to be immature Marsh Hawks (*Circus hudsonicus*). The stomachs of three of them were empty, that of the fourth containing a small

quantity of fur. The presumption is that all were of the same species, as nothing was said that indicated any difference in size or kind.

In many years of collecting specimens in North Carolina, I do not think I ever saw more than two of this species at one time; certainly never more than three. Hence, the recording of this very unusual congregation.—H. H. BRIMLEY, *Raleigh, N. C.*

A Duck Hawk Attacks Four People.—Having always read that Duck Hawks (*Falco peregrinus anatum*) will never actually attack a man, I received quite a surprise when on June 12, 1935, I visited the famous Duck Hawk cliffs of Monument Mt. in Great Barrington, Mass. with a party of about fifteen. The nest was discovered in a location much easier to reach than usual and so six or seven of us climbed down to look at the four downy young. One of the adults was flying about making a great commotion. "Go right down to the nest," I said to one of the photographers in the party, "the bird won't bother you." As soon as he stood on the shelf on which the young were located the adult Hawk made a dive for him and brushed his hair with its powerful wings. Turning in the air, she swooped for him again. He ducked behind a small tree but not quite quick enough, for she hit his camera and dented it. A third time she scratched his hand with her talons. The photographer, by ducking at the right moment, managed to keep from being knocked off the cliff, a straight drop of at least 150 feet, and secured several photographs of the young Hawks.

Several days later, at a more favorable time for taking pictures, the photographer, Orville Wilkinson, returned with a friend. He took sixteen pictures, but not without paying for them. The Duck Hawk struck him on the neck and the scratch later became infected. She followed him a hundred yards or more from the nest and dove at him repeatedly.

Miss Mary Robbins, of the Pleasant Valley Sanctuary, and Perry Gilbert, of Dartmouth, spent three hours on Monument Mt. during the same week. Gilbert wore a white shirt and the Hawk made a try for him at every opportunity. She inflicted a two inch deep cut in his head and nicked him two other times. Miss Robbins received a minor scratch and a small boy, who was standing on the summit some distance from the nest, was hit from behind and knocked on his face.

The attacks were carried on by the same bird. The other adult remained at a distance and did not seem interested. Local people have visited the Hawks in other years but, as far as I know, have never actually been struck.—G. BARTLETT HENDRICKS, *The Berkshire Museum, Pittsfield, Massachusetts.*

Black Rail at Cape May Point, N. J.—On October 5, 1934, while observing the Hawk migration at Cape May Point, I examined a tennis court to see if any migrant birds had by chance struck the wire backstop. I found only one dead bird which from its condition had been killed a day or two previously. It was a Black Rail (*Creciscus jamaicensis stoddardi*) the second specimen so far as I can ascertain to be taken at Cape May. It could not be preserved but a wing was sent to Dr. Witmer Stone to confirm the identification.—ROBERT P. ALLEN, *National Association of Audubon Societies, 1775 Broadway, New York, N. Y.*

Feeding of the American Woodcock (*Philahela minor*).—A Woodcock in the National Zoological Park presented to me an opportunity to observe the actual manner of its feeding. The specimen was caged in a new type glass-front cage, the floor of which was covered with three inches of earth, giving the bird a natural probing area. The glass front of the cage made it possible for me to witness its feeding from a distance of about two feet. The flexibility of the upper mandible is

well known, but of interest was the manner in which the worms, which I had buried in the earth were grasped in the tips of the mandibles and rapidly conveyed to the oral cavity, apparently by suction, created by the bird. This "sucking" of the food to the mouth occurred whenever the bird discovered a worm.—MALCOLM DAVIS, Nat. Zoo Park, Washington, D. C.

Upland Plovers (*Bartramia longicauda*) Increasing in Adams County, Illinois.—Upon my return to Adams County from the University of Illinois in 1910, I recorded no specimens of the Upland Plover in Adams or neighboring counties. It was not until 1918 that an occasional bird was reported from the nearby counties in Missouri. Since that time the increase has been very encouraging, both in Missouri and in Illinois. This spring (1935) at Newark, Missouri, I found four pairs of nesting birds in a single field and there were additional birds flying about the fallow portions of other farms in that vicinity.

Earlier this spring I saw birds at Galesburg, Illinois, and Mr. Harold Holland of that town reports four birds living in the deserted clover field in the old fair grounds. I similarly recorded two birds at Hamilton, Illinois, several pairs at Paloma, Illinois, two pairs at Camp Point, Illinois, a pair at Coatsburg, Illinois, and one at Fowler, Illinois. A friend reports three pairs nesting on his farm at Augusta, Illinois, while I discovered two pair located between Quincy and Liberty, ten miles east. Recently a nest of eggs was brought in by a farmer who lives within five miles of Quincy.

About the 10th of June another farmer called from six miles south of town telling me that he had flushed an Upland Plover from a field of old grass which he was plowing. Twice as he circled the field, the bird left its nest showing marked distress. The third time around, he watched closely. Finally he stopped his horses and found the team standing directly over a complete nest of four eggs.

He left a small patch of grass standing about the nest for protection. The Plover became so accustomed to his presence that it would remain on the nest when he plowed within eight or ten feet of it.

A week later I wished to take pictures of the bird and nest, but my plans were thwarted by a coon. Its tracks clearly indicated who the culprit was, and the broken shells were proof that it had enjoyed a full sized meal.

Such a report, showing the increase of this fine upland bird, will be of interest to conservationists in general.—T. E. MUSSELMAN, Quincy, Illinois.

A Correction.—Attention is called to an error in the writer's Western Willet record printed in 'The Auk,' for January, 1934. The locality cited was South Haven, Berrien Co., Mich.; it should have been South Haven, Van Buren Co., Mich.—C. T. BLACK, Chicago, Ill.

The Black-backed Gull on the South Carolina Coast.—Though a vigilant look-out has been maintained for years by observers in this section for the occurrence of *Larus marinus*, it has been reported but once and that in St. Helena Sound on November 24, 1932, by H. L. Harlee (Auk, 1933, 217). On May 12, 1935, Mr. Lester L. Walsh, who was with the writer on the Cape Romain Federal Bird Refuge, identified an immature specimen of this species on Bull's Island. Mr. Walsh is thoroughly familiar with the species in all stages of plumage and his identification of this bird leads the writer to believe that it has probably been overlooked in the past due to the superficial resemblance to the immature Herring Gull (*L. argentatus smithsonianus*). He is convinced that a bird seen on April 18, 1935, on the Cape Romain Refuge by Mr. Guy Emerson, E. B. Chamberlain and himself, was of this species. The head was much whiter than that of the Herring Gull, the bird sat off

by itself on the water, apart from other Gulls and gave every indication of being a Black-back. It is probably the case that this large Gull frequents the South Carolina coast more generally than has been heretofore believed.—ALEXANDER SPRUNT, JR.—*R. F. D. No. 1, Charleston, S. C.*

The Dovekie Incursion of 1932.—In November, 1932, there was a phenomenal wave of Dovekies (*Alle alle*) on the Atlantic coast, promptly reported and interestingly discussed in 'The Auk' for July, 1933.¹ In the course of time a couple of observations have come to my attention which seem to clarify the nature of this invasion in the latitude of New York City, and will make the record more complete.

On November 19, at Jones Beach, L. I., Mr. William F. Drescher observed Dovekies estimated at about 1,000 individuals flying east, most birds following the shore line closely. The flocks generally seemed to consist of 10 to 20 birds, and the largest was estimated at about 50. The main flight started at 10:30 A. M. and lasted until 2 P. M., and, aside from two stragglers before it started, all birds were seen flying in the one direction. He was in the field from 7 A. M. to 4:30 P. M. and when returning to Wantagh station 'noted a number of Dovekies flying about in a bewildered manner on western side of causeway.'

This observation taken in connection with one from farther east near Westhampton quoted in detail by Murphy and Vogt¹ enables us to reconstruct a seemingly pretty accurate picture of what happened along the Long Island shore, where it was blowing hard from the southeast with heavy rain. A great wave of birds had swept upon the land and was receding to the eastward toward the open sea and safety over coastal waters. From this multitude individuals, in a weakened condition, driven by the wind or confused by the rain, were coming down on the shore, and now and then one turning tail and flying inland, like a flock of wind-blown spume.

Of even greater significance is an observation made at Lavallette, N. J., by Mr. Henry Stevens. He tells me that on the day of the storm there was a steady stream of Dovekies flying south along the beach for some four hours, and estimates that during this time not less than 100,000 individuals passed down the coast, a southward movement probably correlated with their appearance south of their normal range later in the year. The bight of sea between the Long Island and New Jersey shores was very likely crowded with Dovekies coming in from the east and ebbing out along both shores. I would estimate those blown inland or lost as certainly less than 10% of the number present.

To complete the record of this November, 1932, Dovekie flight for the vicinity of New York City I list data which have come to my attention in addition to those in Murphy and Vogt's table. *November 6* (report from 'Local Bird Club'—W. Sedwitz) and *November 8* (report from Miss Cynthia Church), Montauk, L. I., Dovekie not mentioned. About *November 10*, Moriches Inlet to Shinnecock Bay, L. I., a few stragglers driven ashore in a storm more severe than that of November 19 (Le Roy Wilcox). *November 19*, Bayside, L. I., 1 dropped in front yard (S. C. Yeaton); Hollis, L. I., 1 picked up at rear porch, lived 2 days (Mrs. P. S. Campbell); Montrose, N. Y., 1 picked up exhausted in back yard at 4 p. m., another reported found at 7:30 (H. Thurston); Clifton, N. J., 1 landed exhausted in front yard (Chas. Shuster); Rutherford, N. J., 5 observed, Hackensack meadows (Thayer Platts). *November 20*, Brookhaven, L. I., 1 seen in pond with Ducks, flew in, and out after 20 minutes ('Local Bird Club'—W. Sedwitz); Cold Spring Harbor, L. I., 1 killed (B. S. Young), another reported to me by J. Burggraf, picked up in road, is probably the one in the

¹ Murphy, R. C., and Vogt, W., 1933, *Auk*, L (3), pp. 325-349.

published table; Mecox Bay, L. I., a few (J. F. Kuerzi, et al.); Montauk, L. I., 50, a few dead (J. F. Kuerzi, et al.); Quogue, L. I., 15 found dead on beach, 1 alive but tar-covered ('Local Bird Club'—W. Sedwitz); Danbury, Conn., 1 dead, on road (Elwood Logan); Kensico Reservoir, N. Y., 2 observed (Elwood Logan); Peekskill, N. Y., some 8 scattered birds found exhausted (High School pupils—Miss Marguerite Powell, science teacher); Clinton, N. J. (some 50 miles west of New York City) 1 found dead, 1 exhausted (James Rintoul); Princeton, N. J., 1 picked up alive, died next day (V. W. E. Payne—C. H. Rogers). November 21, Seaford, L. I., 1 from here brought to K. W. Baasch at Baldwin (H. C. Raven); Princeton, N. J., 1 picked up on a pool (Prof. Marcus S. Farr—C. H. Rogers). November 22, Eastport, L. I., a few stragglers still present in the bay, alighting in Duck decoys (Wilcox). November 24, Baldwin, L. I., 1 swimming in creek (H. C. Raven). November 25, Barnegat Light, Bradley Beach, Manahawken Bridge, Manataloken Bridge, and Toms River Bridge, N. J., about 2 at each of these localities (M. C. Rich). About December 1, Dunellen, N. J., 1 found dead on a pond (Miss Marie Shultz); and December 3, Far Hills, N. J., 1 killed by a cat ('Messenger-Gazette'), the above two records from Mrs. Theodore Herbst.—J. T. NICHOLS, New York, N. Y.

***Microsittace ferruginea minor* in Northern Patagonia.**—Several years ago in work with a collection of birds from Patagonia presented to the Museum of Vertebrate Zoology by Mr. J. R. Pemberton I listed three specimens of Parrot taken June 3, 1912 on the Upper Arroyo Las Bayas in western Rio Negro under the name *Microsittace ferruginea*.¹ This is apparently the most northern record for the species on the eastern side of the Andes. Recently, through the kindness of Dr. Joseph Grinnell, I have again examined these skins to find on careful comparison that they represent the form *Microsittace ferruginea minor* Chapman which has been currently supposed to range only in Chile. The birds from Rio Negro have the smaller size (wing measurements 180.0 to 181.5 mm.), the darker green coloration, and the darker abdominal red of this race, and are readily differentiated from typical *ferruginea* of farther south.—ALEXANDER WETMORE, U. S. National Museum, Washington, D. C.

The Range of *Amazona oratrix*.—While working on the distribution and relationships of the Parrots of the American genus *Amazona* Lesson, it seemed evident that *auropalliata* (*Psittacus auro-palliatu*s Lesson, Rev. Zool., 1842, p. 135.—Realejo, Nicaragua) and *oratrix* (*Amazona oratrix* Ridgway, Man. No. Am. Bds. 1887, p. 587. New name for *Chrysotis leuallantii* G. R. Gray, not *Amazona leuallantii* Lesson) were conspecific. An apparent barrier to such treatment was the fact that both birds were recorded from two nearby localities in Honduras and from Ruatan Island.

Feeling confident that some error was present I started upon the task of running down the basis of the records with some rather interesting results. *A. oratrix* is attributed to Ruatan by Salvin and Godman in the 'Biologia Centrali Americana,' Aves, II, 1897, p. 587, the collector being given as Gaumer and the authority for the statement, Ibis, 1889, p. 241. Reference to 'The Ibis,' year and page stated, fails to find any mention of this fact; the paper by Salvin, part of which appears on that page, deals briefly with the results obtained by Godman and some of his collectors in northern Mexico. In the same volume of 'The Ibis,' Salvin published a list of the birds collected on the coast of Yucatan and islands in the Bay of Honduras by Geo. Gaumer and on page 373 definitely lists *auropalliata* from Ruatan Id. based on several specimens (listed in Catalogue of Birds, XX, p. 292 as spec. *f-i*, adult and *k*, imm;

¹ Univ. California Publ. Zool., vol. 24, 1926, p. 432

5 skins). The only other species of *Amazona* recorded from Ruatan is the very different *A. autumnalis* (Linn.). No specimens of *levaillantii* (i. e. *oratrix*) are listed in the 'Catalogue of Birds,' p. 294 from any point nearer than the State of Vera Cruz, Mexico, and it would therefore appear that the record of *oratrix* on Ruatan was due to a slip on the part of the authors of the Aves volumes of the Biologia.

The record of *oratrix* from Yohoa, Honduras rests on the tenuous grounds of sight record and interpretation of a misapplied name. In 'The Ibis,' 1860, p. 121, Taylor mentions under *Chrysotis auripalliata*, a Parrot at Yohoa much resembling *auripalliata* in plumage "but rather smaller with the yellow on the fore part of the head instead of behind, . . . but it was unnecessary to shoot one." On p. 317 he writes "the parrot mentioned on p. 121 as much resembling *Chrysotis auripalliata* is *Chrysotis xanthops*." [*Psittacus xanthops*, is a Brazilian species. The name was for a time erroneously applied to what is now called *oratrix*]. In the absence of a specimen, and due to the fact that Taylor's description of the birds seen by him at Yohoa does not differ from *auropalliata* as *oratrix* does, I see no reason for regarding the record as pertaining to any thing other than *auropalliata*. Ridgway, Bull. U. S. Nat. Mus., no. 50, pt. 7, 1916, p. 233 records *auropalliata* from Chasniguas, Honduras, a specimen collected by Erich Wittkugel. I have never been able to locate Chasniguas on any map, but it is apparently somewhere in the valley of the Chamelicon River or in hills between it and the Guatemala boundary.

Recent collectors in Caribbean Honduras have obtained only *auropalliata* (Peters 1928, Emlen and Worth 1930). J. H. Townsend secured *auropalliata* on the "Segovia River" but the exact spot is not known.

In spite of the hiatus in distribution of *A. oratrix auropalliata* and *A. ochrocephala panamensis* Cabanis (*Chrysotis panamensis* Cabanis, Journ. f. Orn., 22, 1874, p. 349, Panama) a gap which includes the greater part of Costa Rica, there is no doubt that the *oratrix* group is a representative of *ochrocephala* (*Psittacus ochrocephala* Gmelin, Syst. Nat., 1788, p. 339.—South America) and should stand as a subspecies.

The "formenkreis," if this view is accepted will be as follows.

Amazona ochrocephala tresmariae Nelson. Range.—Tres Marias Islands, off the west coast of Mexico.

Amazona ochrocephala oratrix Ridgway. Range.—Mexico in states of Tamaulipas, Vera Cruz, Puebla, Mexico, Guanajuato, Colima, Guerrero and Yucatan; British Honduras.

Amazona ochrocephala auropalliata (Lesson). Range.—Extreme eastern Oaxaca, Chiapas, Pacific slope of Central America to northwestern Costa Rica, extending into the Caribbean lowlands of norther Honduras east at least to the Ulua Valley; Ruatan Island.

Amazona ochrocephala panamensis (Cabanis). Range.—Panama and the tropical lowlands of northern Colombia east to the Santa Marta region.

Amazona ochrocephala ochrocephala (Gmelin). Range.—Colombia (east of the base of the Eastern Andes), Venezuela and the Guianas, south to the Rio Branco and the middle Amazon.

Amazona ochrocephala xantholaema Berlepsch. (Orn. Monatsb., 21, 1913, p. 147). Range.—Island of Marajó, at the mouth of the Amazon.—JAMES L. PETERS, *Museum of Comparative Zoology, Cambridge, Mass.*

A New *Rhinoptynx* from Argentina.—Upon examination, it appears that specimens of *Rhinoptynx clamator* from Tucuman, Argentina, are different from previously described forms of the species. They are therefore characterized as a new race.

***Rhinoptynx clamator mogenseni* subsp. nov.**

Subspecific characters.—Similar to *Rhinoptynx clamator maculatus* (Vieillot) but with more of a light ochraceous or tawny buff tinge to light areas of upper parts; outer webs of greater wing coverts with large areas of buffy to white 15–20 mm. long and 8–12 mm. wide, instead of bars and mottlings of dusky on these areas; dark brownish bars on two central tail feathers distinct only near the shaft, becoming so invaded by light buffy mottlings as to be indistinct toward the margins, instead of being distinct clear across the feather; size averaging slightly smaller, wing of female averaging less than 285 mm.

Type.—Adult female, Field Museum of Natural History, No. 59,095, Concepcion, Tucuman, Argentina, January 3, 1917, collected by J. Mogensen, original No. 1369.

Measurements of type.—Wing, 278; tail, 142; tarsus, 62; culmen, from cere, 23 mm.

Range.—Southern Bolivia to Tucuman, Argentina.

Remarks.—Three other specimens of this race have been examined, two from Tucuman, Argentina, and one from Rio Surutu, Bolivia. They agree in having the above-described characters. Three specimens of *Rhinoptynx c. maculatus* have been examined, and in addition, data and measurements of four others were available. Eleven specimens of *Rhinoptynx c. clamator* have been examined.

The collector of the type specimen, for whom the race is named, has done considerable collecting of birds and mammals in Argentina.

It is interesting to note that three other Owl races, *Strix rupestris chacoensis*, *Pulsatrix perspicillata boliviana*, and *Glaucidium brasilianum tucumanum* are confined to the range of the above-described race and to adjacent Paraguay.

Many thanks are due to Dr. W. H. Osgood of the Field Museum of Natural History, and to officers of the Museum of Comparative Zoology and the Carnegie Museum for opportunity and permission to study these specimens.—LEON KELSO, and ESTELLE H. KELSO, *Washington, D. C.*

Food of the Barn Owl.—In the summer and fall of 1934 at Mastic, Long Island, one or more large pale-colored Owls came at dusk about and entered an open barn or large shed adjacent to woodland at the edge of our farm yard. It was always too dark to get a good look at the bird, which was never there in the daytime, but it could only have been a Barn Owl (*Tyto alba pratincola*), as could also Owl notes heard in the vicinity in fall, and from their size and shape, pellets picked up in the barn. Some 15 such pellets were gathered in the summer or early fall, a few scraps in February, and some 16 that were found by careful search in the spring of 1935, were very likely mostly left-overs, making some 30 to 35 pellets in all. An analysis of their content (by D. G. N.) is estimated from skulls as 60 individual meadow mice (*Microtus pennsylvanicus*), 11 short-tailed shrews (*Blarina brevicauda*), 2 young rats (*Rattus*), 1 house mouse (*Mus musculus*).

We were surprised to find the rat, which often forms a large item in the Barn Owl's diet, so poorly represented, particularly as rats were abundant about the adjacent farm barn; and with that in mind record this item for students of the feeding habits of this species. This particular Owl or Owls must have hunted over open ground, very likely at some little distance from this roost, to have captured so large a percentage of meadow mice.—DAVID G. and J. T. NICHOLS, *New York City*.

Richardson's Owl in Wisconsin.—Since so little recent information is available concerning the status of Richardson's Owl (*Cryptoglaux funerea richardsoni*) in Wisconsin, the writer deems it advisable to make known the capture of three of these Owls near Hayward, Sawyer County, in northern Wisconsin. All were shot

within a few miles of the town; all were taken by the same boy at the same place; all were mounted by Mr. Karl W. Kahmann of Hayward. The first, a male, was taken on December 12, 1930, and is now in the possession of Mr. G. W. Friedrich of Chicago. Two were taken during the winter of 1933-34: a male, December 26, 1933, now in the possession of Mr. Kahmann, and a female, January 18, 1934, now in the Aard-vark Shop in Chicago.—C. T. BLACK, *Chicago, Ill.*

White-throated Swift at Hot Springs National Park, Arkansas.—Sometime during a driving rainstorm out of the northwest on the night of May 3-4, 1935, a White-throated Swift (*Aeronautes melanoleucus*), apparently disabled from a combination of exhaustion and wetting, found its way through a west-exposed window on the eleventh floor of the Medical Arts Building at Hot Springs National Park, Arkansas. Just before daylight, it was found fluttering helplessly on the floor of a wash-room, and was carried to the street by the night watchman of the building, where it was released. By some quirk of chance, Joe Maner, a PWA employee of the National Park Service, happened along just in time to rescue the floundering bird from destruction in the early morning traffic, and he brought it to the National Park Headquarters, where it was turned over to the writer. I immediately recognized in it a correspondence with a plate of the White-throated Swift in Reed's 'Land Birds East of the Rockies' (Doubleday, Doran & Company 'Nature Guide Series'), although I had never seen one of the birds before. Lacking reference material on birds of such western distribution, I called in Dr. W. H. Deaderick, of Hot Springs, an associate of the A. O. U., for his opinion. After a careful check of measurements and marks of identification from his library, Dr. Deaderick confirmed my tentative determination.

In view of the unprecedented dust storms that had been prevailing for some time in the normal range of these birds, and the fact that the Hot Springs region represents the southeastern fringe of the affected territory, Dr. Deaderick and I concluded that there must be a definite connection between the occurrence of the dust phenomenon and the appearance of this bird so far east of its accepted distribution. Whether it represented a migratory detour to the east around the dust clouds, or a direct flight eastward from the oppressive effects of the dust, is a matter of interesting conjecture. At any rate, to confirm our identification, a study skin was prepared and submitted to the National Museum, where it stands as a record of the first White-throated Swift found in the State of Arkansas. Dr. Herbert Friedmann, of the National Museum, states that it "represents a very considerable eastward extension of the known range of the bird."

In view of the possibility of dust-clogged lungs playing a part in the disability of this individual, and that it may be available for use in any study of dust storm effects upon birds of the West and Mid-West, the body was carefully preserved, and is available for the use of any reliable student.

This individual is a fully developed female, sex organs well developed, measurements as follows: Length 6.30, Extent, 13.40, Wing 5.75, Tail, 2.40 Bill .28, Tarsus .39, Middle Toe .20, its claw .28.—H. R. GREGG, *Acting Park Naturalist, Hot Springs National Park.*

The Yellow-bellied Sapsucker and the Ruby-throated Hummingbird as Commensals.—In addition to the reference given by Mr. Francis H. Allen in the last July 'Auk,' p. 310, regarding the above, if Mr. Freer and Dr. Murray will refer to my 'Birds of Hatley' published in the January issue of 'The Auk' for 1916, p. 70, they will find a note on the subject.—HENRY MOUSLEY, 4073 Tupper Street, Montreal.

Concerning a Probable Incorrect Record of *Empidonax hammondi* from Northwestern Montana.—In 'The Auk' for October, 1921 (pp. 552-65), appears an article by Thomas D. Burleigh on 'Breeding Birds of Warland, Lincoln Co., Montana,' recording the observations of the writer in that locality during the summer of 1920. This is an important list, and the first one published from the extreme northwestern corner of Montana. In examining the paper for the first time, however, I find one probable mistake to which I feel constrained to call attention.

Under the name *Empidonax hammondi* (Hammond's Flycatcher), Burleigh writes: "This was an abundant summer resident and was found anywhere and everywhere, in the open country about the town, in the slashings, in the open woods in the valley and well up the mountain sides. In nesting it showed no preference for any special site and the situations chosen varied widely . . ." Detailed descriptions of the ten nests follow. On the other hand, *Empidonax wrighti* (Wright's Flycatcher) is missing from the list.

It happens that I am pretty well acquainted with the bird life of the locality named, having resided in Lincoln County most of the time since beginning the study of birds in 1921. And though I must confess that for several years my field identification of Flycatchers was not entirely accurate and resulted in certain mistakes in my own early records, these were cleared up by later careful study of the habits, nesting, and notes of the various species, and finally by an opportunity to examine specimens in questionable cases. So it is with full confidence that I now venture the opinion that the "abundant summer resident" listed by Burleigh as *E. hammondi* was not that species, but *E. wrighti*.

During thirteen summers of observation in practically all parts of Lincoln County, including the vicinity of Warland, I have never observed a bird now believed to be *E. hammondi*. *E. wrighti*, on the other hand, is by far the commonest Flycatcher in that region, occurring almost everywhere about the farms and cut-over land of the valleys and foothills, and ranging sparingly to timberline on the more sparsely timbered mountains. It nests in deciduous trees and shrubs along the streams, and in evergreens in the coniferous forests. Nests which I have found correspond in materials and construction with those described by Burleigh as nests of *E. hammondi*.
—WINTON WEYDEMEYER, Fortine, Montana.

Late Date for Prairie Horned Lark Nesting in Central Ohio.—On June 10, 1935, six miles east of Zanesville, Ohio, at the junction of State Highway 146 and a side road, and in a cow pasture, I saw a Prairie Horned Lark (*Otocoris alpestris praticola*), with food in its bill. It was not long before I found its nest in the pasture lot surrounded by weeds some four inches tall. There were three young in the nest. They were almost grown for the last one left the nest on June 16.

On June 20 another nest in the same pasture, fifty feet from the former one, was found by Eugene Goode who was with me at the field. It contained one egg that day and on June 22 had three eggs. On June 24 there were still three eggs so it seemed the clutch was complete at that egg number.—SAMUEL E. PERKINS III, Indianapolis, Ind.

Nesting of the American Raven in Cimarron County, Oklahoma.—On June 18, 1935, about sundown in company with Ira E. Myers of Boise City, Oklahoma, I visited an abandoned windmill where several years previously, a pair of Golden Eagles had nested. I found the Eagle's nest gone, it probably having been destroyed during the recent high velocity sand storms. However, in its place was another nest and on a close approach an American Raven (*Corvus corax sinuatus*)

left it. The nest was situated about 18 feet from the ground and contained seven young birds from three to ten days old. The nest was constructed of Russian thistle stems, lined with carrion fur and rabbit's fur.—WALTER COLVIN, *Arkansas City, Kansas*.

A Raven Specimen from Ohio.—Wilson (1825) wrote of the Raven as "entirely supplanting the Crow on the southern shores of Lake Erie. Other early writers recorded it as not uncommon in the early history of the state. Read (1853) reported the species as still frequent. Wheaton (1882) recorded the Raven as a "rare winter visitor." He continued, "It soon became less numerous, and in the course of fifty years had disappeared as a regular visitor from all parts excepting the northern portion of the state where it is now rare." Jones (1903) assumed that the bird still lingered in northwestern Ohio (Fulton County) on the basis of questionable reports from local residents. Dawson (1903) gave no additional records but in a migration table gave the date "Nov. 21-25, 1896" for the Cleveland region without any substantiating comments. The last published record of a Raven taken in Ohio seems to be of a bird killed near Marysville, Union County on Sept. 3, 1879. Except for the bird recorded below, no Ohio specimens are known to exist.

In 1933 I learned through Dr. Amos W. Butler of the existence of a Raven specimen collected in Ohio and owned by Charles J. Stockbridge of 2323 S. Webster St., Fort Wayne, Indiana. Several letters were exchanged with Mr. Stockbridge and through this correspondence the details of the record were learned. Mr. Stockbridge also kindly consented to send the specimen to the writer for examination at the Ohio State Museum, but postponed this action due to illness, and unfortunately died without having done so. Since his death I have twice visited Fort Wayne and studied the specimen where it is now housed with the Stockbridge collection of mounted birds at the Fort Wayne-Allen County Historical Society Museum. Also the widow and daughters of Mr. Stockbridge kindly added to the information previously obtained concerning the specimen and permitted me to examine notebooks and records of the Stockbridge collection.

Mr. Stockbridge was a well known naturalist and taxidermist of Fort Wayne, operating a store there until 1891. During the winter of 1889-90 a Raven was shot in Indiana near Fort Wayne and brought to Mr. Stockbridge for mounting. This Indiana specimen was sold some months later but the record of the name of the buyer was lost, and although in later years attempts were made to locate it, no trace of it was ever found. The same winter another hunter shot a second Raven in the vicinity of the then existing Paulding Reservoir located in Paulding County, Ohio, and brought it in the flesh to Mr. Stockbridge for mounting. This bird, a male taken Feb. 8, 1890, is the specimen now to be found in the Fort Wayne-Allen County Historical Society Museum Stockbridge collection of the birds of the Fort Wayne region. This mounted bird is in fine condition. It is a large specimen, appearing mammoth in contrast with a Crow beside it in the same display case. No information is available of any Ravens taken in the region except these two, which although shot in different states, were from localities only a few miles apart.

Dr. Harry C. Oberholser, when informed of the existence of this only known Ohio Raven specimen, expressed the opinion that it could be referred to *Corvus corax europhilus* Oberholser (described Ohio Journ. Sci. 17: 215. 1918). No measurements were submitted but the region of occurrence would seem to indicate the specimen to be of this form. The 1931 A. O. U. Check-list, however, does not recognize this race, in which case the present specimen on the basis of distribution data given by the 'Check-List' and pending definite taxonomic determination, could

tentatively be referred to the Northern Raven (*C. c. principalis*) or possibly to the American Raven (*C. c. sinuatus*).—LAWRENCE E. HICKS, *Ohio State University, Columbus, Ohio*.

The Raven (*Corvus corax* subspecies) in Dane County, Wisconsin, and a Note on its Food Habits.—In October, 1934, Mr. Edward M. Searls and Mr. G. W. Longenecker of the University of Wisconsin noticed a dead Raven (shot by duck hunters) beside their Duck blind while hunting at Crystal Lake in the northwestern corner of Dane County, Wisconsin. Word of this reached me late in the winter and I went to Crystal Lake as soon as the snow melted. A short search at the spot where the Raven had been found soon located it. Fly larvae had removed all tissue so that only the bones and feathers remained. The feathers of one wing were still attached and gave a wing measurement of 405 mm., which indicates a female *europhilus* Oberholser. This race however is not recognized in the A. O. U. 'Check-List' and of the two forms there listed it would seem by its wing length to be *C. c. sinuatus*.

The larvae had eaten the walls of the gizzard, but the tough lining remained untouched. Upon opening the gizzard, I found three pits which Dr. Norman C. Fassett of the Botany Department kindly identified for me as belonging to the genus *Prunus*.

This preservation of the gizzard lining is worthy of attention. In warm weather decay may completely destroy the gizzard, but in cooler weather this preservation can be of great value in learning of food habits when the body is little more than a skeleton.—LEONARD WILLIAM WING, *University of Wisconsin, Madison, Wisconsin*.

The Short-billed Marsh Wren Breeding in Maryland.—On May 26, 1935, near Point Lookout, Maryland I found a number of Short-billed Marsh Wrens (*Cistothorus stellaris*) scattered through an area of partly dry marsh, and collected two for specimens. The birds were singing and seemed definitely established for the summer. In subsequent visits on June 2 and 16 half a dozen pairs were located, and careful search was made for nests without result. On June 25 better fortune was in store as after some search a female was flushed from a nest containing seven heavily incubated eggs. The nest was suspended in the top of grass about fifteen inches above the ground, and was entirely concealed from above. On close inspection the spot was marked by the tips of the surrounding plants being bent over and woven into the top of the nest. This nest and eggs were collected for the U. S. National Museum.

A few minutes later, at a point fifty yards distant, the male of this pair was observed carrying material to a half finished nest, and nearby was another already completed. These appeared to be dummy nests, and I was interested in noting their comparative remoteness from the one with eggs.

While this is the first record for the nesting of the Short-billed Marsh Wren in Maryland so far as I am aware, and the farthest south that it has been found breeding east of the Alleghanies, the bird is more common on this part of the eastern coast than was formerly supposed. On April 29, 1929, I collected one in open marsh seven miles south of Ocean City, Maryland, and A. H. Howell and T. D. Burleigh¹ observed half a dozen pairs in open marsh bordering an inlet near Pungo on the coast of Virginia, May 17 to 20, 1932. It seems probable that the birds may breed regularly in the localities mentioned.—ALEXANDER WETMORE, *Smithsonian Institution, Washington, D. C.*

¹ Auk, 1934, p. 250.

Short-billed Marsh Wren in the Valley of Virginia.—The Short-billed Marsh Wren (*Cistothorus stellaris*) is apparently very rare in Virginia. Only three specimens have been taken in the Washington, D. C. region, none of them from Virginia. The only recent record from western Virginia that I have been able to find is from Montgomery County (E. A. Smyth, *The Auk*, XXIX, p. 526). Consequently I was surprised to find it not uncommon in one locality near Lexington, Virginia, in May, 1935. In a wet rye field near Cameron's Pond I found one on May 9; four on May 15; and two on May 20. I had very close views each time and noted the small size, streaks on the top of the head and absence of decided line over the eye. I am quite familiar with the Long-billed Marsh Wren. The birds were singing continually.—J. J. MURRAY, *Lexington, Virginia*.

Hermit Thrushes Nesting in West Virginia.—On June 23, 1935, students and staff members of the Oglebay Park, Wheeling, W. Va., Nature Training School, while on their annual camping trip in the mountainous part of West Virginia, found two nests of the Eastern Hermit Thrush (*Hylocichla guttata faxoni*). Both were on an old fern-covered road bank in deep red spruce and northern hardwood forest, near Cheat Bridge, Randolph County, West Virginia, at elevations approximating 3,700 feet and 3,800 feet; and both contained young birds. The nests were photographed.

Indicative of the character of the Cheat Bridge region is the finding of the nests, by this group, of the Olive-backed Thrush (*Hylocichla ustulata swainsoni*), Veery (*Hylocichla fuscescens fuscescens*), Mourning Warbler (*Oporornis philadelphia*), and other northern forms. The Eastern Golden-crowned Kinglet (*Regulus satrapa satrapa*), which seems to skip over a considerable territory in the southward extension of its nesting range, was found feeding young on Barton Knob, near Cheat Bridge, on June 25, 1935. The Eastern Purple Finch (*Carpodacus purpureus purpureus*), whose nesting range is given in the Fourth Edition of the A. O. U. 'Check-List' as extending southward to the mountains of Maryland, was found to be a common species in the vicinity of Cheat Bridge.—A. B. BROOKS, *Oglebay Park, W. Va.*

Mountain Bluebirds in Minnesota.—On April 5, 1935, along the east bank of the Mississippi River in Sherburne County about five miles south of St. Cloud, Hiemenz came upon a pair of Mountain Bluebirds (*Sialia currucoides*). He followed the male to get a closer view and then he also saw the female which was totally unlike the female Eastern Bluebird. The male was cerulean on the back, head, and wings. The wing tips were black which contrasted sharply with the blue when he sat with folded wings. The throat and breast were a grayish blue and the belly, white. The female was grayish brown on back and head. The throat was grayish buff and the belly, white. The rump was light azure blue and the wings showed light blue when in flight. The birds seemed much at home, their actions approximating those of the Eastern Bluebirds. They stayed close together and allowed a close approach, but were unusually silent, the only note uttered being a call note similar to, but perhaps a trifle harsher, than that of the Eastern Bluebird. He watched the birds for almost an hour and at last reluctantly left them after he was certain of their identity. As far as is known, this is the first record of this species having ever been encountered in Minnesota.

On April 7, 1935, Hiemenz with Friedrich and Voth set out to relocate the Mountain Bluebirds. The chances of finding them seemed very slight and we were really surprised when we came upon the pair about half a mile from where they had previously been seen. They were in a patch of scrub Bur Oaks. The male was very wary and would not allow a close approach but at last was collected with the female.

How the birds happened to be here is a mystery. This is far out of their range and a logical theory is that they were blown from their usual course by the dust storms of early spring, but to find a pair, evidently mated, seems to call for a better explanation. That they were still here on April 7, seems to point to the conclusion that they might have remained to nest.

Taverner in his 'Birds of Western Canada,' 1926, states that the Mountain Bluebird is extending its range and is found quite commonly as far east as central Manitoba.

The birds are on display in the museum of the State Teachers' College at St. Cloud, Minnesota.—NESTOR M. HIEMENZ, RICHARD D. VOTH, GEORGE W. FRIEDRICH, *State Teachers' College, St. Cloud, Minn.*

The Correct Name of the Spotted Flycatcher.—Since the rediscovery of the 'Adumbratiuncula' of Vroeg's Catalogue, 1764, Pallas's name *Motacilla striata*, proposed on page 3 of that work, has been in use for the Spotted Flycatcher. The combination *Muscicapa striata* (Pallas) Richmond, 1905,¹ however, is rendered invalid by the much earlier *Muscicapa striata* Forster, 1772,² which refers to the Black-poll Warbler. On this account the Spotted Flycatcher must again be known as *Muscicapa griseola* Linnaeus, 1766,³ which is the first available name. I am indebted to Mr. James L. Peters for advice on the nomenclatural point involved.—PIERCE BRODKORB, *Museum of Zoology, Ann Arbor, Michigan.*

The Occurrence of Sprague's Pipit in Michigan.—On June 21, 1935, while driving northeast from Lovells, Michigan, Louis W. Campbell, Bernard R. Campbell, and Milton B. Trautman noted a striking bird song which they could not recognize. In spite of a steady drizzle of rain they spent two hours trying to get a glimpse of the singing bird but were unsuccessful. On June 25 Trautman and Josselyn Van Tyne returned to the spot to continue the search.

On reaching the place we immediately heard the bird singing and, the weather being clear, we soon saw the bird singing high in the air. Two and a half hours of vain pursuit were ended by approaching darkness. Returning at five-thirty the next morning we continued our efforts to collect the bird and six hours later finally succeeded. It proved to be an adult male Sprague's Pipit (*Anthus spraguei*) in breeding condition. It is now No. 84587 in the bird collection of the University of Michigan Museum of Zoology.

On the three days it was observed the bird occupied a territory about a quarter of a mile square of barren "jack pine plain," sparsely covered with coarse grasses, sweet fern, and a few small pine and oak saplings. The territory adjoined the east side of the Lovells-Lewiston road, a mile and a half northeast of Lovells in Crawford County.

A remarkable characteristic of this bird was the persistence with which it sang. Some fifty song flights were noted during the three days it was observed. The shortest of these flights lasted about seven minutes and the longest was over thirty minutes in duration. The song was repeated at very regular intervals, averaging about six complete songs per minute. The greatest number of songs counted in one flight was one hundred fifty-eight. The best description we have seen of the flight song of Sprague's Pipit is that by W. J. Breckenridge in T. S. Roberts' 'Birds of Minnesota' (vol. 2, pp. 153, 1932). However, contrary to Dr. Roberts' opinion,

¹ Smiths. Misc. Coll., 47, pt. 3, p. 345.

² Philos. Trans., 62, art. 29, p. 406.

³ Syst. Nat., ed. 12, 1, p. 328.

we feel very sure that the singing bird often rose to a height of at least 800 feet. We endeavored to check this as carefully as possible by measuring horizontal distances at which the bird was watched and comparing these with vertical distances.

At the end of a song period the bird would drop almost vertically to the ground, or, more often, it would swoop down only to pursue some passing Vesper Sparrow or Prairie Horned Lark. Frequently these pursuits were long and determined.

As Elliott Coues stated (*Birds of the Northwest*, 1874, pp. 43) the species is very difficult to locate or approach when it is on the ground. When approached it flushes at a considerable distance and darts off with a rapid, undulating flight.

It has been asserted several times that Sprague's Pipit sings only on the wing. For example, Aretas A. Saunders (*Auk*, 39, 1922, p. 175) says, "I have never known Sprague's Pipit to sing in any other manner than on the wing." On several occasions, however, we heard this Pipit sing from the ground and once we watched it sing from the top of a small telephone pole. These songs, while identical in pattern with the flight songs, were much less loud and clear.

Although this Pipit had clearly established a breeding territory and was vigorously defending it, we found no evidence of a mate. The occurrence of a stray male defending its territory does not necessarily constitute a breeding record, even though it would be easy and natural to assume so. We have noted a number of similar cases. For instance, on June 14, 1934, we observed a Clay-colored Sparrow (*Spizella pallida*) established and singing at the Edwin S. George Reserve near Pinckney, Michigan, at least a hundred miles south of its nearest known breeding area. This Sparrow persisted in singing for about two weeks when it apparently became discouraged and left. In spite of much effort spent in searching, we could find neither female nor nest. Doubtless this bird too, was unable to find a mate.

This capture of Sprague's Pipit constitutes the first record of the occurrence of the species in Michigan.—MILTON B. TRAUTMAN AND JOSSELYN VAN TYNE, *University of Michigan Museum of Zoölogy, Ann Arbor, Michigan*.

Philadelphia Vireo on Long Island, N. Y.—On May 25, 1935, I observed a Philadelphia Vireo (*Vireo philadelphicus*) at Bayside, Long Island, N. Y., I realized the excessive rarity of the bird on Long Island and was particularly careful in my identification. The bird was working its way through the tops of a group of American chestnut saplings, much as does the Red-eyed Vireo.—HERMAN BOHN, *3329 171st St., Flushing, N. Y.*

Swainson's Warbler in the North Carolina Mountains.—On May 8, 1934, while observing the spring migration of Warblers just outside Tryon, N. C., I was surprised to find a Swainson's Warbler in open woods on a ridge about 100 yards from the nearest water, a small spring. The next day I saw it again in the same woods, but, as I had been taught to believe that "water, tangled thickets, patches of cane and rank growth of semi-aquatic plants" were indispensable to its existence, I hesitated recording this sight record.

However, on my trip to Tryon this spring I found a pair of these birds in the same woods only a few hundred yards from where I had seen one last year. One bird was noticeably larger and attentive to the smaller, but I do not think they were nesting. One bird sang infrequently this year from the ground and in the bushes, and my notes show that these birds were seen by me every day for six days, May 9 to 14. I studied them for hours and was able to get within thirty feet and watch them through 8x glasses as they hunted among the leaves. Parts of the hill have thick growths of mountain laurel, but these warblers did not confine themselves to the thickets but were often in the open woods and were easily observed.

I have hunted successfully for Swainson's Warblers near Charleston, S. C. with my friend the late Arthur T. Wayne, but did not expect to find them in the mountains in such an entirely different environment. After writing Mr. H. H. Brimley, Director, State Museum, Raleigh, N. C., I believe that this is the first record of Swainson's Warblers for western North Carolina.

I was also surprised to find in looking through the Index to 'The Auk' only two references to Swainson's Warbler during the past ten years.—ELLISON A. WILLIAMS, 27 Limehouse St., Charleston, S. C.

Breeding of Swainson's Warbler in Robeson County, North Carolina.—According to Pearson and the Brimleys 'Birds of North Carolina,' (pp. 275, 276) Swainson's Warbler (*Limothlypis swainsoni*) has been reported in North Carolina only from the semi-coastal counties of Craven and Chowan, the only nest found being in the latter county. On May 2, 1935, I found a nest of this species in Little Raft Swamp, at the edge of the town of Red Springs, Robeson County, N. C. Red Springs is 90 miles inland and 35 miles southeast of Pinehurst. The nest was located two feet from the ground in the top of a mass of honeysuckle vines growing over a small bush, and was the usual bulky mass of leaves, lined with fine rootlets. It was in a rather dry section of the swamp, 200 yards from the stream. There is very little cane growth in this swamp. When found the nest was apparently completed but empty. The first egg was laid on May 6, and the second on May 7, after which I had to leave the region. The eggs were creamy white, with no markings. I had seen both birds, but not being able to actually see one on the nest during the day I visited it at night with a flashlight and studied the bird on the nest at arm's length at my leisure. Not having a state permit I did not collect the bird or eggs. Another empty nest was found on May 2, a mile or more away in the same swamp and near the stream, and a bird observed in the vicinity; and a fourth bird was seen at still another place. I did not hear any of the birds sing, but heard the call note, more throaty and full-bodied than that of most Warblers.—J. J. MURRAY, Lexington, Virginia.

The Dickcissel (*Spiza americana*) in the Northern Neck of Virginia.—While in a field between King George and Shiloh, King George County, Virginia, on July 4, 1935, we were somewhat surprised to see a Dickcissel (*Spiza americana*) which flew up from the ground at a distance of six or eight feet.—AUSTIN H. AND LEILA F. CLARK, U. S. National Museum, Washington, D. C.

Dickcissel in South Carolina.—Mr. W. B. Gadsden, on January 20, 1935, described to me a strange bird which he had noticed in his yard at Summerville, S. C. From the description it seemed likely that the bird was a Dickcissel. To positively identify it, Mr. E. B. Chamberlain of the Charleston Museum, and Mr. Dungar Robb and I made two trips to Summerville and were rewarded on the second with an excellent opportunity of observing it at arm's length on Mr. Gadsden's window feeding station. It proved a male Dickcissel (*Spiza americana*) in rather dull plumage. From information furnished Mr. Chamberlain by the United States Biological Survey, this is the first winter record for the United States.

The bird remained until April 10, when it was last observed by Mr. Gadsden. It was usually to be found in company with a flock of English Sparrows. It sang incessantly, despite temperatures which at times dropped to 18° F. Its plumage, which had at first been so dull as to cause difficulty in picking it out from the Sparrows at a distance, brightened considerably in the weeks it stayed in Summerville.—W. W. HUMPHREYS, 15 Limehouse St., Charleston, S. C.

Record of Snow Bunting (*Plectrophenax n. nivalis*) in North Carolina.—Following the verbal report of a Snow Bunting in eastern North Carolina, the following letter from Miss Grace Wheat, of New York State, is submitted: "The Snowflake was first seen by me near the Love Cottage at White Lake, N. C. (Bladen County), on January 23, 1934. It was feeding with several Fox Sparrows and many White-throated Sparrows under the grape vines in the pullet pen. I saw the bird three days in succession near the buildings, and during three different cold spells after that the bird was seen feeding with Sparrows. Never but one seen. There is no question as to the identity of the Snowflake, as I have seen flocks of them in the dooryard of my home in central New York state."

I have no hesitancy in presenting the foregoing letter as constituting an acceptable record.—H. H. BRIMLEY, *Raleigh, N. C.*

Notes on Some Rare Birds in Southwestern Maine.—*Colinus virginianus virginianus*. BOB-WHITE.—After many years of absence this bird appeared in Berwick in 1932; a flock was seen within half a mile of our house that season. In 1933 one was heard near the house, and it was repeatedly heard in Wells the same season.

Zenaidura macroura carolinensis. MOURNING DOVE.—Though of regular occurrence in southern Maine, its occurrence is rare enough to be of interest. I saw one at Berwick August 17, 1933; flushed another in Wells, August 10, 1934, and on June 6, 1935, saw a pair feeding about two miles from this place in Berwick. I saw one July 26, 1928, at Mount Desert Island in Hancock County.

Telmatodytes palustris dissaepius. LONG-BILLED MARSH WREN.—Many years ago this bird appeared in our marsh in Berwick, bordering the Salmon Falls River, where I found one of its nests. I have not seen it here since that season.

Cistothorus stellaris. SHORT-BILLED MARSH WREN.—This evasive little Wren is now known to be a summer resident in various places in Maine, eastward to the Penobscot River valley and northward somewhat beyond Bangor; but few of these stations have been recorded. July 12, 1933, near Belgrade Station in Kennebec County, in a marshy place I saw closely and heard the outpouring of song of one of these birds. As the botanizing party of which I was a member was moving on, I had not time to look for the nest which I suspected to be near. Several others saw the bird at the same time.

Corthylio calendula calendula. RUBY-CROWNED KINGLET.—On July 9, 1932, I closely observed a young Ruby-crowned Kinglet in Berwick, the first I have ever seen here in summer.

Dendroica discolor discolor. PRAIRIE WARBLER.—July 24, 1921, I saw a pair of Prairie Warblers feeding young, out of the nest, in a scrub oak barren in Sanford, York County, Maine, and again in the same area July 6, 1922, I saw them. No opportunity to visit that section again occurred until the summer of 1932, when I found that an extensive and very destructive fire had consumed all vegetation in the region. Though this bird has not been reported from Maine its occurrence in New Hampshire, some forty-five miles distant, has long been reported.

Ammodramus savannarum australis. GRASSHOPPER SPARROW.—For over forty-five years, to my certain knowledge, at least two pairs of these birds have nested annually on our farm in Berwick. So far this year, (1935), I have seen only one singing male.—ANNE E. PERKINS, M.D., *Berwick, Maine*.

Bird Records New or Uncommon to Maryland.—While engaged in field work in Worcester County on the coast of Maryland, May 22, 1935, the writers observed a flock of four Brown Pelicans (*Pelecanus o. occidentalis*) on Sinepuxent Beach some

six miles southwest of Ocean City. When first observed, the birds were flying southward over the tidal marsh as if flying from Sinepuxent Bay to the ocean beach. A short time later they were noted on a small sand spit on the ocean side of the barrier beach about a mile south of where first seen. No previous record of this species is known for Maryland.

It was somewhat surprising to find the Boat-tailed Grackle (*Cassidix mexicanus major*) a fairly common bird in the tidal marshes of this same beach, since the area is near the extreme northern limit of the species' range. Birds of both sexes were also observed a short distance north of Ocean City. While no young or eggs were seen, the birds were obviously nesting.

Because the Goshawk (*Astur a. atricapillus*) is so extremely uncommon in Maryland, it seems advisable to report an unpublished record of one shot near Taylors Island, Dorchester County, about the middle of March, 1918. The specimen was mounted by a local taxidermist and is now in the collection of Ralph W. Jackson, Route 1, Cambridge. A few other records, including a breeding record, are known for the state.—CLARENCE COTTAM AND F. M. UHLER, *U. S. Biological Survey*.

Rare Birds in the District of Columbia.—On June 25, 1935, in company with W. Howard Ball I visited a moist bottomland and rather sterile meadow bordering the Potomac River below Congress Heights and about three miles due south of the Capitol which were formerly swampy flats covered with reeds, reed-grass, wild rice and sedges but now reclaimed by filling in. The area, a few acres only in extent, is now a lush thicket of herbs, button bush and black willow. Here a number of birds which are very rare in this vicinity were found. A single male Dickcissel (*Spiza americana*), frequently seen singing in the top of a dead shrub. Several Short-billed Marsh Wrens, and their dummy nests were present but no nests with eggs was found. On the more sterile meadow two Upland Plover (*Bartramia longicauda*) and some Prairie Horned Larks (*Otocoris alpestris praticola*).—DR. TITUS ULKE, 5000 Fourteenth St., N. W., Washington, D. C.

Notes of Interest from Georgia.—*Pisobia fuscicollis*. WHITE-RUMPED SAND-PIPER.—An adult of this species was observed May 21, 1932, feeding on a mud flat with Least and Semipalmated Sandpipers and a Semipalmated Plover at South River near Atlanta, Georgia. The bird's similarity to the Pectoral Sandpiper was immediately noted, but its white upper tail coverts and other points proved it to be neither the preceding nor Baird's Sandpiper. It was observed at fifteen feet with 8 x glasses and good light.

Chordeiles minor chapmani. FLORIDA NIGHTHAWK.—A specimen taken in Atlanta May 25, 1933, by Mr. Arthur H. Howell of the Bureau of Biological Survey establishes *chapmani* as the breeding form there; however, we should like to place on record the occurrence of a bird of this form in Rabun County, August 27, 1933. The wings of the bird, found dead on the highway, were used as the basis of identification by Dr. Harry C. Oberholser.

Cyanocitta cristata cristata. NORTHERN BLUE JAY.—A bird collected May 29, 1933, in Atlanta, Georgia was identified by Dr. Oberholser as an intermediate between the northern and southern races but nearer *cristata (bromia)*. The bird was certainly breeding as evidenced by the condition of the testes, and this specimen helps to establish the definite range of the northern form.

Sitta carolinensis atkinsi. FLORIDA NUTHATCH.—A bird taken at Lake Rabun, Rabun County, was identified as *atkinsi* by Dr. H. C. Oberholser. The bird was collected during the middle of the breeding season, June 22, 1933. This occurrence

is interesting as it must be very close to the northern limit of the range of the Florida form in Georgia.

Sitta pusilla pusilla. BROWN-HEADED NUTHATCH.—The occurrence of this species is of course not unusual, but, on referring to all available literature, no record of a second brood of the Brown-headed Nuthatch was found. Wayne in 'Birds of South Carolina' went so far as to declare Audubon's statement that this species rears two or three broods erroneous. It might be of interest that on May 21, 1932, a nest was found at Lakewood Park, Atlanta, with four eggs in the process of incubation in the same cavity of a fence post that had harbored almost full-grown young about May 1 of the same year.

Oporornis agilis. CONNECTICUT WARBLER.—Two observations of this rare Warbler are herewith placed on record to supplement the two records of Mr. Earle R. Greene (Birds of the Atlanta, Georgia, Area). The first was seen at close range with a 6x glass May 7, 1932, in a wet thicket on the outskirts of Atlanta, and the second was observed in a similar situation by Mr. Nelson T. Spratt, Jr., May 21, 1932. White eye ring and other points were noted on both occasions.—DON EYLES AND NORMAN GILES, JR., *Biology Department, Emory University, Emory University, Georgia*.

Some Notes on Florida Birds.—Supplementing Mr. Broun's interesting notes in the July 'Auk,' pp. 320-21, we submit the following observations made in Florida in late March and early April, 1935.

Pelecanus erythrorhynchos. WHITE PELICAN.—Seventy-seven were on the north-east side of Merritt's Island, March 25 (Loetscher); and four, with ten brown ones, were flying over the Gulf, off Pass-a-grille, April 1 (Eliot).

Ardea occidentalis. GREAT WHITE HERON.—A pair seemed to be domiciled near the bridge from the mainland to Key Largo, March 28.

Nyctanassa v. violacea. YELLOW-CROWNED NIGHT HERON.—Apparently rare: seen only at a heronry near Jacksonville, March 24.

Plegadis f. falcinellus. GLOSSY IBIS.—A single, immature bird, flying over the water from the south-west, alighted on the north-east shore of Lake Okeechobee, March 27 (Eliot).

Rostrhamus sociabilis plumbeus. EVERGLADE KITE.—In the St. Johns marshes, west of Vero Beach, on March 27, a pair was apparently nest-building. One was twice seen with a long wisp of grass in its bill. One kept watch from a bush-top, the other was mostly out of sight in the long grass near by.

Haematopus p. palliatus. AMERICAN OYSTER-CATCHER.—One was on an exposed oyster-bed, south of Sarasota, March 31.

Charadrius nivosus tenuirostris. CUBAN SNOWY PLOVER.—The only one seen (first spied by Mr. L. V. Morris) was at Naples, March 30.

Sterna d. dougalli. ROSEATE TERN.—One south-east of Tampa on March 31 was identified with care, in knowledge of its rarity.

Thalasseus sandvicensis acyflavidus. CABOT'S TERN.—Two, strutting in courtship, were observed in perfect light on March 24 at Matanzas Inlet. A rare species on the east coast. We saw others on the west.

Columba leucocephala. WHITE-CROWNED PIGEON.—A male, alone and remarkably tame, was closely studied on the Keys, March 28,—an early date.

Tyrannus d. dominicensis. GRAY KINGBIRD.—Seen but once, at Naples, March 30.

Hylocichla guttata faxonii. EASTERN HERMIT THRUSH.—One, out of three, east of Gainesville, April 2, briefly sang. We mention this because of Mr. Broun's note on p. 311.

Anthus spinoletta rubescens. AMERICAN PIPIT.—Eight were seen, south of Gainesville, on April 1 (Loetscher). Apparently a late record for the state.

Limnithlypis swainsoni. SWAINSON'S WARBLER.—Having supposed this species was always associated with "cane," we were surprised when on April 3, near Jacksonville, Mr. S. A. Grimes showed us one singing in caneless woods where its most prominent companions were Hooded Warblers and (not yet arrived) Acadian Flycatchers and Wood Thrushes.

Seiurus motacilla. LOUISIANA WATER-THRUSH.—One, with two Northern Waterthrushes, was at a roadside slough in Collier County, March 29.

Euphagus carolinus. RUSTY BLACKBIRD.—One was heard singing, and perfectly seen, on March 25, a few miles west of Daytona Beach, where (according to Mr. R. J. Longstreet) it seems to be very rare.

Ammospiza maritima subsp. (SCOTT'S?) SEASIDE SPARROW.—This species seems to be casual or unknown on the west coast south of Tarpon Springs. Eliot saw one as far south as Venice, in the grass back of the beach, on March 31; and the next day, while trying to spy some Scott's Clapper Rails among mangroves in western Pinellas County, he flushed another very big, dark Seaside Sparrow.—S. A. ELIOT, JR., Northampton, Mass., and F. W. LOETSCHER, JR., Princeton, N. J.

July Notes from Alabama.—The first half of July may often be considered a rather dead season of the year for bird study in the interior of the South, but I have been peculiarly fortunate this year in noting a number of unusual species during this period of time. Among the most interesting are the following.

Casmerodius albus egretta. AMERICAN EGRET.—A single bird was recorded at Lake Purdy, near this city, first on July 11 and again on the 15th.

Florida caerulea caerulea. LITTLE BLUE HERON.—Abundant on Lake Purdy.

Fulica americana americana. AMERICAN COOT.—I am able to discover only a single previous instance of this bird's summering in the state. I saw a lone individual on East Lake on July 5 and on several subsequent occasions.

Actitis macularia. SPOTTED SANDPIPER.—Southbound migrants noted at Lake Purdy, July 15.

Tringa solitaria solitaria. SOLITARY SANDPIPER.—Lake Purdy, July 15.

Pisobia minutilla. LEAST SANDPIPER.—Very early southbound migrants noted at Lake Purdy on July 11.

Limnodromus griseus scolopaceus. LONG-BILLED DOWITCHER.—A single bird of this species seen at Lake Purdy, July 15, seems to constitute the second record from the interior of the state.—HENRY STEVENSON, JR., 7759 1st Ave., So., Birmingham, Ala.

Bird Records for Indiana.—While Dr. Amos W. Butler and I were at Mt. Vernon and New Harmony in Posey County Indiana, for the Indiana Academy of Science meeting, May 10–11, 1935, we took occasion to catalog the mounted birds in the High School and Public Library at the former place and the Library at the latter.

Several specimens seen there are of especial interest:

Scotiaptex nebulosa nebulosa. GREAT GRAY OWL.—In Mt. Vernon Library. It was collected by Mr. Short at Hovey's Lake, Posey County some years before 1913; was presented to John C. Leffel and mounted for his collection. Mr. Leffel gave it to the Library about 1913. This seems to be the second record for the state with a specimen. I photographed this specimen.

Buteo borealis harlani. HARLAN'S HAWK.—A specimen is in the Library at New Harmony. It was obtained many years ago in Posey County, Indiana but data are not complete as to who collected it. This specimen was photographed by me.

Aquila chrysaëtos canadensis. GOLDEN EAGLE.—This specimen was collected on the Elliott Farm in Posey County, Indiana, January 12, 1923, by Raymond Conyers as it attempted to carry away a little pig. This specimen was presented by him to the Library at New Harmony.—S. E. PERKINS III, Indianapolis, Ind.

Notes from Northeastern and East Central Illinois.—The writer considers the following records noteworthy either because of the rarity of the species mentioned or because of the unusual date of occurrence of the species at the locality cited.

Gavia immer elasson. LESSER LOON.—On May 4, 1935, during a period of heavy rains and cloudy weather, an adult male of this subspecies in full breeding plumage mistook the wet surface of a concrete highway near Urbana (Champaign Co.) for that of a stream and alighted on it, but without apparent injury. Being unable to rise from the pavement, it floundered about until a passing motorist picked it up and brought it to the offices of the State Natural History Survey at Urbana. There it was kept in captivity for a few days, but before it could be liberated it died, perhaps from injuries incurred in striking the concrete road-surface. The skin is to be presented to the University of Illinois Museum of Natural History. Measurements in millimeters, taken in the flesh, are: length 720, extent, 1,286, wing 355, exposed culmen 72.5, depth of bill at base 24.5, tarsus 80.4, outer toe with nail 115.3. This is apparently the first published record of the occurrence of this subspecies in the state of Illinois.

Dafila acuta tzitzihoo. AMERICAN PINTAIL.—A male in immature plumage was observed by the writer on August 19, 1934, on a gravel bar in the Fox River, a few miles south of McHenry (McHenry Co.). This bird was either an extremely early migrant or a bird of the year; in either case the record is of interest.

Lophodytes cucullatus. HOODED Merganser.—A male and female were observed by the writer on Lake Michigan off Lincoln Park, Chicago (Cook Co.), on January 2, 1935. This species does not often occur in winter in the Chicago region.

Aquila chrysaëtos canadensis. AMERICAN GOLDEN EAGLE.—One, the picture of which was shown in the Chicago Tribune at the time, was taken near Slocum's Lake, three miles west of Wauconda (Lake Co.) on about October 21, 1932, by Mr. Bruno Kathrein, who had it mounted. An immature bird was shot by Mr. Sam Fields four miles north of Longview (Champaign Co.) on January 5, 1934. The mounted bird was recently examined by the writer. A third record is that of an immature bird seen near Urbana by Mr. A. C. Twomey, on April 13, 1935.

Sterna hirundo hirundo. COMMON TERN.—An adult bird was observed by the writer at the new lagoon in the northward extension of Lincoln Park, Chicago, on the surprising date of December 2, 1934. This is apparently the latest fall record of this species in the Chicago region.

Tyto alba pratincola. BARN OWL.—Two Chicago records are: one bird, wounded in one wing, was caught alive on October 26, 1934, by Jennie Cortellasi, and its photograph shown in the 'Chicago Tribune'; another flew into a sun parlor on the fourteenth floor of the St. Luke's Hospital on September 9, 1931, its picture being shown in the 'Chicago Daily News.' A down state record is that of a male killed by a boy in Urbana on December 10, 1934, and mounted by Mr. A. C. Twomey, in whose possession it now is.

Nyctea nyctea. SNOWY OWL.—An adult female was shot April 27, 1931, by Mr. William Buesing on a farm near Mount Prospect (Cook Co.) and mounted for him. This is an extremely late spring record for this species in the Chicago region. A more recent Chicago record is that of one, probably a female, seen by the writer on December 2, 1934, in the new northward extension of Lincoln Park.

The following records of the Snowy Owl are all from central Illinois, where it is of rather uncommon occurrence. During the winter of 1934-35 two were noted. In the writer's collection there is the skin of an adult female which was shot by a farmer on December 7, 1934, near Leverett (Champaign County); the stomach was empty. Another, now in the collection of Mr. A. D. King of Mattoon (Coles Co.), was killed in the fall of 1934 near that town. During the winter of 1930-31 two others were taken: a mounted female now in the Ridge Farm High School, shot by Lindsay Harrington two miles west of Woodyard (Edgar Co.) in November, 1930, and a mounted bird now in the collection of the University of Illinois Museum of Natural History, taken by Lloyd Fuoss in March, 1931, near Thawville (Iroquois Co.). An additional fairly recent record is that of one shot by a farmer three miles southwest of Decatur (Macon Co.) in February, 1930, and now in the collection of Boy Scout Troop Fifteen of Champaign. Two old, but unpublished records are: in January, 1904, one was taken by I. E. Hess at Tolono (Champaign Co.), and in January, 1883, another was killed by E. A. Gastman five miles southeast of Decatur; both were mounted and are now in the collection of Boy Scout Troop Three of Decatur.

Zonotrichia leucophrys gambeli. GAMBEL'S SPARROW.—Two birds of this species in late fall plumage were collected on November 30, 1934, near Newton (Jasper Co.); the skins are now in the collection of Mr. A. C. Twomey.

The writer expresses his appreciation to Dr. A. R. Cahn, of the University of Illinois, for permission to include the late spring record of the Snowy Owl, and to Mr. A. C. Twomey, for permission to utilize his records of the Golden Eagle and Gambel's Sparrow.—C. T. BLACK, *Chicago, Ill.*

Notes from Mammoth Cave National Park (Proposed), Kentucky.—The following notes were made during the summer of 1934.

Otocoris alpestris praticola. PRAIRIE HORNED LARK. Common summer resident on high open ridges. Young were observed out of nest July 4, near Ollie, Kentucky.

Stelgidopteryx ruficollis serripennis. ROUGH-WINGED SWALLOW.—Two nests were observed June 12, with young, near the head of First Creek. The nests were built in small holes in the ceiling of large caves formed in a sandstone bluff.

Sitta carolinensis carolinensis. NORTHERN WHITE-BREASTED NUTHATCH.—This Nuthatch is a permanent resident of this area. June 5, two adults were observed feeding five young just out of the nest along Floating Mill Hollow. June 11, four young were observed on Jim Lee Ridge.

Troglodytes aëdon aëdon. EASTERN HOUSE WREN.—A pair of House Wrens nested at CCC Camp No. 1 in the tool house, and escaped with five young. A pair was observed June 8, 9, 12 and 20 at CCC Camp No. 2. The House Wren has been considered as a rare migrant for Kentucky.

Cistothorus stellaris. SHORT-BILLED MARSH WREN.—A pair was found inhabiting a large sink in Doyle Valley which is grown up to weeds waist high. The place is damp and bordered by tall sedge grass. After the young had left the nest and were old enough to care for themselves, the female was collected for a nesting record in Kentucky.

Helmitheros vermivorus. WORM-EATING WARBLER.—A common summer resident in the dense wooded hollows. An adult was observed feeding young July 10, along the slope of Ugly Creek.

Wilsonia citrina. HOODED WARBLER. Common summer resident; adults observed feeding young June 12 and July 10, 1934.

Piranga erythromelas. SCARLET TANAGER.—Two pairs were observed nesting in the park area, one in Floating Mill Hollow, and the other along Ugly Creek.—

CLAUDE W. HIBBARD, *Resident Wildlife Technician, National Park Service, Mammoth Cave, Kentucky.*

Spring Notes from Lawrence, Kansas.—April, 1935, at Lawrence, was warm and dry, and indicated that the drouth of 1934 was to continue for another year. Consequently, many of the earlier migrants appeared at their normal times. However, the last week of April saw a decided change. Heavy spring rains started and continued almost every day for six weeks. All rivers and creeks overflowed their banks, in some cases doing much property damage. Hundreds of nests of ground-nesting birds, such as Meadowlarks, were destroyed.

The month of May was very cool, the thermometer going down to the low forties almost every night. Late migrants were retarded, and the inclement weather made field work hard and disagreeable, so that many normally common species were not recorded at all. A few records, however, seem worthy of mention.

Coccyzus erythrophthalmus. BLACK-BILLED CUCKOO.—The writer took a pair of these birds seven miles southwest of Lawrence on May 25, 1935. The female contained well-developed eggs, and would have been laying in a few days. Although this species seems to be rare about Lawrence, the Museum has several specimens in the collection, and there is one breeding record. This species seems to prefer the darkest, dampest parts of the timbered regions, in marked contrast to the yellow-billed species, which is found in more open situations.

Antrostomus carolinensis. CHUCK-WILL'S-WIDOW.—The writer took a male of this species seven miles southwest of Lawrence, on May 4, 1935. It was flushed from a thick growth of Papaw brush under a stand of small oak and elm trees. It flew only a short distance, then settled down on the limb of a fallen tree, sitting *crosswise* instead of *lengthwise* of the branch. Its appearance was extremely owl-like.

This is the first specimen taken in Douglas County, but there are two other records. C. E. Johnson (Wilson Bull., Vol. 39, No. 3, pp. 156-158), reports hearing one at Lake View, May 11, 1923. C. D. Bunker, W. H. Burt, and several members of the ornithology class at the University of Kansas, saw one a few miles northwest of Lawrence, April 25, 1927. (Unpublished). The species is quite common a hundred miles south of Lawrence.

Dendroica aestiva rubiginosa. ALASKA YELLOW WARBLER.—An adult male of this dark subspecies was taken by the writer one mile southwest of Lawrence, on May 17, 1935. There are three other records of the occurrence of this bird here, and it is probably a fairly common migrant, having been overlooked for many years. (Long, Auk, July, 1935).

Dendroica palmarum palmarum. WESTERN PALM WARBLER.—A male, taken by Normal A. Preble, on April 27, 1935, was the first one seen here for several years. It had eaten a small green caterpillar.

Seiurus motacilla. LOUISIANA WATER-THRUSH.—Normal Preble took a female Louisiana Water-thrush, seven miles southwest of Lawrence, on April 27, 1935. This is the second authentic record for the state, the first being taken in Douglas County, May 8, 1915. There is one other specimen, without data, which probably was taken in Kansas.

While this species has been reported as a common migrant from many localities, it has very likely been confused with Grinnell's Water-thrush, *Seiurus noveboracensis notabilis*, which is a regular migrant, and represented by a good series of skins in the Museum collection.

Wilsonia canadensis. CANADA WARBLER.—The writer took an adult male, seven miles southwest of Lawrence, May 25, 1935. It was in full song in the underbrush

near a little stream flowing down a steep hillside. This Warbler has been taken at Neosho Falls, and in Doniphan County (three records) but not in Douglas County before this time.—W. S. LONG, *Museum of Birds and Mammals, Lawrence, Kansas.*

Some Breeding Birds of the Pine Forest Mountains, Nevada.—On the afternoon of June 4, 1935, my companion, Dr. Richard M. Eakin, and I worked our car south along the crest of the Pine Forest Mountains to within six miles of Duffer Peak. We chose a camp site at 7000 feet in an aspen grove that bordered a meadow. In the next three days we made acquaintance with several interesting avian households, occupants of our camp grounds. First to attract attention was a pair of Hairy Woodpeckers (*Dryobates villosus*) that had partially excavated two nest holes in the smooth trunk of a living aspen, fifty feet from our tent. Both holes had been worked this season, but the upper one could never have been completed for it was only six inches above the other.

During the first day, June 5, commotions were frequently noticed at the Woodpecker's tree. The trouble was instigated by a pair of Mountain Bluebirds (*Sialia currucoides*). Whenever the Woodpeckers alighted near the holes, both Bluebirds attacked by diving at them, uttering harsh notes and apparently snapping their bills. Such attacks often lasted five minutes. Evidently the Woodpeckers were too much disturbed by them, possibly also by us, and deserted. During the last two days at camp, no more fights were seen and the Bluebirds were carrying nest material to the tree. The Woodpeckers stayed in the grove, often close to camp, but did not go to the trees near the nest. Since the Bluebirds were just beginning to build, the Woodpeckers were clearly the first occupants and had been dispossessed. Irrespective of other factors which may have contributed to their departure, there was no doubt of the intention of the Bluebirds to displace them.

On June 6 the female Bluebird went to an unfinished Robin's nest just over the tent and settled in it, much to my surprise. She plucked material from the margin and flew to her own nest hole. The Robins added to their nest later that day. The Bluebird, symbol of happiness and gentleness, became to us a different character, whose actions, viewed anthropomorphically, were aggressive and piratical. Inter-specific competition for nest material and nest site were enacted before us.

Yet the Woodpeckers were not inactive territorially, for while submissive to the Bluebirds, they appeared to be excited by the presence of other Woodpeckers. Drumming was frequent, and once at close range the female was seen to drum. This "song" of the Woodpeckers is essentially a masculine function, but perhaps, as in many passerine birds, female Woodpeckers occasionally "sing" or announce territory. I found that tapping on wood with some metal object brought the birds overhead where they called vigorously and drummed.

At dusk, Poor-wills (*Phalaenoptilus nuttallii*) called from the Artemisia brush. One individual with an especially high voice and rapid cadence came two evenings to the same lookout post, an aspen branch six feet above the ground. Its eye shine was always ruby colored, and only one eye was visible at a time. It hawked for insects from this perch, and as we whistled in imitation it circled overhead within four feet, giving a soft guttural "querk." Poor-will calling was rarely heard except during crepuscular hours.

At about 6:30 p. m. as the shadow first touched the aspen grove a muffled hoot, repeated at one second intervals, sounded from the trees up the hill slope. It was the note of a Long-eared Owl (*Asio wilsonianus*). In quality it resembled the note of the Band-tailed Pigeon. The pitch at first approximated that of the hoot of a female Horned Owl. As the hoots were repeated the pitch was raised as much as five half

tones. Even so, they were remarkably low for so small an Owl. Six to twenty hoots were given in a series and often only a few minutes elapsed between groups of hoots.

Actually the bird was calling much nearer camp than we first thought. We found the nest in an aspen only seventy feet away. The sitting bird did not hoot, but the male, or at least the bird not incubating, was heard frequently throughout the night, calling from trees between twenty and fifty feet from the nest. It stopped calling when we approached too closely, nor would it hoot with the flashlight shining on it.

The incubating bird sat closely, its eyes shining with a white light, both eyes visible at once. The nest held three incubated eggs. At about 7:30 p. m. on June 6 and 7 a hoot four or five half tones higher than the highest notes of the usual call was heard two or three times, once simultaneously with the lower note. An immediate trip to the nest disclosed the absence of the female. Evidently this was the note of the female and was given only when away from the nest. She returned each night after less than half an hour's absence. Thus another species of Owl proves to have a sexual difference in hoot, with the female higher pitched as usual (see Miller, Condor, XXXVI, 1934, pp. 212).

Our purpose in visiting the Pine Forest Mountains had been to secure breeding Juncos. Walter P. Taylor in his survey of this region (Univ. Calif. Publ. Zool., VII, 1912, pp. 319-436) reported a juvenal *Junco oreganus thurberi* taken July 30. This he hesitated to consider as evidence of breeding because he thought it possible that the bird might have strayed from the Warner Mountains, eighty-five miles to the west. From my recent reconnaissance of the intervening desert region I doubt that a Junco would move through such uninviting regions in July. We were successful in securing three adult Juncos on the point of breeding; no others were seen. One mated pair, the male singing, was taken as the two birds fed together among snow banks in the limber pine timber at 8,400 feet. The female had yellow pigmented ova 3 mm. in diameter. This female was a fairly typical *thurberi*; the male was a hybrid *J. c. caniceps* × *J. mearnsi* with cinnamon-colored sides but bright red back. The third bird, a female with gonads similarly enlarged, was a typical *J. o. shufeldti* of the type breeding in the Cascade Mountains of northern Oregon and Washington.

The limited area of Boreal life-zone evidently supports a small breeding population of Juncos of mixed character recruited from the adjacent species and races in Idaho, Nevada and California. The *shufeldti* may have been a retarded migrant but it was not a cripple and was sexually active. No migratory flocks were present and the last wave of migrants in this area was three weeks earlier. Possibly in certain unfavorable seasons no Juncos breed in these mountains so that there may not be a self-perpetuating stock over any great length of time.

Four species that we found in the Boreal and Transition areas were not listed by Taylor as summer residents. These were Ruby-crowned Kinglet (*Regulus c. cineraceus*, M. V. Z. no. 67129), Hermit Thrush (*Hylocichla g. polionota*, M. V. Z. no. 67123), Downy Woodpecker (*Dryobates p. leucurus*, M. V. Z. nos. 67108, 67109), and Crossbill (*Loxia curvirostra*). The Kinglets were not common but a few nesting pairs were found in the denser patches of limber pine. Hermit Thrushes were fairly common in the pine forest. The Crossbill was a solitary bird seen in the pines; there is no certainty that it was breeding. Hairy Woodpeckers (*D. v. orius*, M. V. Z. nos. 67100-67103), which were nesting commonly in the pines as well as in the aspens at camp, were not mentioned by Taylor.—ALDEN H. MILLER, Museum of Vertebrate Zoology, Berkeley, California, July 16, 1935.

In Reference to 'The Birds of Wrangell Island.'—In my paper on the birds of

Wrangell Island (Univ. of Toronto Studies, Biol. Series, no. 28, 1926), I excluded from full treatment six specimens in the Carnegie Museum which were indicated by label as having been collected at Wrangell Island in August, 1911, by F. E. Kleinschmidt. A thorough search of the literature pertaining to Wrangell Island and its fauna did not reveal any reference to an expedition there in 1911. A reference by Thayer (Auk, Vol. XXVIII, 1911) however, indicated that Captain F. Kleinschmidt had been in north Pacific waters in 1910. Thayer relates the difficulties encountered that year by his private expedition, in charge of Mr. John Koren, the object of which was to collect specimens on Wrangell Island. Storms and ice conditions prevented Koren from reaching his objective. Further, he comments that Captain F. Kleinschmidt, who had started a northern cruise a week earlier, "managed to get to Cape Serdze . . ." The writer interpreted this statement as meaning that Captain Kleinschmidt too had not reached Wrangell Island in 1910 and since I had no knowledge of Captain Kleinschmidt's expedition of the next year (1911) from the literature, I assumed there was error in the labelling of the specimens in the Carnegie Museum. For that reason, they were omitted from further treatment.

I have learned indirectly from Captain Kleinschmidt that these specimens are correctly labelled and, therefore, on his authority, *Chen hyperborea hyperborea* and *Somateria v. nigra* can be added to the list of Wrangell birds.—L. L. SNYDER, Royal Ontario Museum of Zoölogy, Toronto.

Stereoscopic Vision in a Single Eye?—In an article¹ which appeared some months ago occurs the following statement. "Nearly all birds have eyes on the sides of the head. Such birds, of course, can have no binocular vision. Many nevertheless possess stereoscopic vision which they get by virtue of the fact that they have two maculae (spots of sharpest vision) in each eye. This gives in the one eye the two pictures from two different angles which constitute the *sine qua non* for stereoscopic vision." (Italics mine.)

* Concerning this last remarkable sentence, one might comment, "Interesting, if true." But if it be true will some physicist please explain how it is possible for one lens (the essential focussing element) to produce two pictures in one eye. The eye, as any biologist known, is simply nature's camera. Its lens can certainly produce but one image on the sensitive surface of the retina. Degree of sensitiveness has nothing to do with it. The presence of two maculae can have no more to do with the production of two images than the placing of two sensitive plates in one camera. Or, following out the logic (?) of the quotation, if one should have a special plate made for his camera with two spots or areas of, let us say, super-sensitive panchromatic emulsion, surrounded by a moderately sensitive emulsion over the remainder of the plate, he should somehow get "two pictures from two different angles."

The article further states, "And thus, at least up to the present moment, in the visual apparatus of birds the actual climax of eye-evolution has been reached. These animals, it is true, cannot rationalize about the earth and the sun as we can, and yet they do indeed behold 'the child of the sun' as we can never hope to see it and they can also gaze back—some of them, at least—upon the parent sun itself without injury, without pain, and with a sense of glorious effulgence we can never understand." (Italics mine.)

One may seriously question, though I do so with less assurance than in the case of the first quotation, whether any bird can actually look directly at the sun, focussing

¹ Shastid, Thomas Hall. The Evolution of Eyes. The American Scholar, Vol. II, No. 4, Oct. 1933, pp. 441-442.

its image on the retina as with other objects directly viewed. That some birds, with the protection afforded by the nictitating membrane, may be able to look more nearly toward the sun than we, may be true. But focussing the image of the sun with any lens, so far as I know, means burning of the screen on which the image is formed in a very short time, and hence I find it difficult to believe that any bird can do this without injury and pain. Perhaps the author of the article did not mean to imply direct focussing, which is my interpretation of "gaze back . . . upon the parent sun itself."—CHARLES T. VORHIES, *University of Arizona, Tucson, Arizona.*

A Good Bird Blind.—The problem of providing a shelter for photographing or studying birds has long been a rather puzzling one. Several good blinds have been devised but they usually have the disadvantage of great weight or are unnatural in appearance. I have devised a blind which is natural in appearance in most situations and is not bulky to move while the material used in construction is not expensive.

Take a piece of poultry netting five feet high and about thirty feet long. Fold this over so that a double piece is formed about fifteen feet long. Between the two layers of netting spread a thin layer of hay, grass or any other similar material. The two layers of netting are fastened together along the edges and at several points through the middle with hog rings or short pieces of wire. This makes a sheet of hay covered and held in place with the poultry netting. This can be set on edge and fastened to stakes set in a circle near the nest and makes a most comfortable and natural appearing blind. The hay can be pushed aside at any point to make observation holes or by removing one or two of the wires from the netting a hole large enough for a camera lens can easily be made. A cover can be made in the same way and fastened on with short lengths of wire. The hay, when exposed to the weather, will last for several months and can easily be replaced by removing the rings or wire fasteners. The netting itself will last for years in most climates.—FRANK R. SMITH, *Fredericktown, Pennsylvania.*

Another "Three-legged Bird."—In the last number of 'The Auk' there was an interesting note on a Thrush with three legs which called to my mind an abnormal skin of an Eastern Meadowlark (*Sturnella m. magna*) in the collection of the United States Biological Survey. This bird has a rye straw, 0.3 cm. in diameter imbedded in the right leg and belly. The straw, which pierced the fleshiest portion of the leg just below the cnemial process of the tibia, extends well up into the abdominal cavity. The projecting part of the straw is 9.6 cm. long, while that contained in the body is 2.6 cm. long. The bird, normal in other respects, was in good condition, with the wound completely healed, when shot at Herndon, Va., January 11, 1911.—PHOEBE KNAPPEN, *Washington, D. C.*

Cavity Nesting Species Descending Chimneys.—In 'The Auk,' vol. LII, page 303, Mr. Olin S. Pettingill gives an instance of an American Merganser (*Mergus m. americanus*) being found in a room in New Hampshire, after having descended the chimney, presumably mistaking the aperture for a possible nesting site. Dr. Witmer Stone has noted this same occurrence in regard to the Wood Duck (*Aix sponsa*) near Philadelphia.

The writer is able to record two such instances in the case of the Wood Duck, one of an Eastern Sparrow Hawk (*Falco s. sparverius*) and one of a Southern Screech Owl (*Otus a. asio*). All of these instances took place in a dwelling on Bull's Island, South Carolina, and all were discovered by Mr. Edward M. Moore, the Superintendent of that plantation. It was quite evident that all of the birds had gained entrance to the

rooms in question by means of the chimney and as all are cavity nesting species, it seems to indicate that such birds are so trapped oftener than would be supposed. It seems queer that, with the multitude of natural cavities which abound in the woods, birds would be deceived by the opening of a chimney.—ALEXANDER SPRUNT JR., *R. F. D. No. 1, Charleston, S. C.*

Correction.—In my note on bird and egg weights (*Auk*, 1935, pp. 203-204) the following errors occurred: Semipalmated Plover ad. male July 17 weight should be 46.05 grms. "Dowitcher four new hatched" should read "Least Sandpiper four new hatched." Northern Phalarope ad. female, June 10 weight should be 39.55 grms. Arctic Tern one two days old, July 13 weight should be 21.12 grms. Common Redpoll three ad. "females" should read "males." Smith's Longspur "ad. male" June 18 should read "ad. female."—A. MARGUERITE HEYDWEILLER, *Cornell University, Ithaca, N. Y.*

RECENT LITERATURE.

Connery's 'Governmental Problems in Wild Life Conservation.'—This volume¹ is one of the publications of the Faculty of Political Science of Columbia University, the author being an instructor in the Department of Government of that institution. He states that as the problems considered are governmental they are "ripe for the consideration of students of government as well as for the professional biologist" and therefore he feels that no apology is needed for "invading a field which at first glance appears to belong exclusively to the natural sciences."

In his introduction the author defines conservation, as he understands it, as the protection of all species "from destruction and their quantity increased unless it can be clearly demonstrated that a particular species is destructive of property out of all proportion to its possible value to society." In the following ten chapters he considers: the changing place of wild life in the national economy; the sphere of Federal and of State Government in wild life conservation; the organization and functions of the Biological Survey and the Bureau of Fisheries; the reorganization of Federal conservation agencies; organization and functions of State conservation departments; problems of game law enforcement and conclusions.

In the first he outlines the agricultural problems of the nation and the present administration's proposed policy of turning a considerable portion of farm land into forest ("land planning") and the inevitable increase in wild life. He considers that "wild life is offered the best chance of increase that it has had for many a year" but points out that "whatever steps are taken to aid wild life conservation must be made to fit into the constitutional pattern of our government system."

Following this he discusses the sphere of Federal and State Government in conservation, tracing the matter from the earliest actions down to the present time with an abundance of quotations and legal references. Then comes a history of the organization and activities of the Biological Survey and of the Bureau of Fisheries. The true function of the Survey he defines as "the protection of the wild game and fur animals as a natural resource in which the whole nation has certain rights." This history makes interesting reading especially the concise account of the various activities of the Bureau. He stresses the varied interests that have tried to influence the work of control and protection and concludes that "the most difficult problem confronting the Survey is to maintain a balance" between these various groups. The agricultural and grazing interests clamor for the destruction of animals injurious to crops the "naturalist groups" contend that the duty of the Survey is "protecting wild life not destroying it," while between is the sportsman's group which is chiefly interested in "more game birds." But even the sportsmen are divided; one section argues that the hunting season should be shortened while the other representing the arms and ammunition makers demands that hunting restrictions be relaxed.

While the author considers that, according to his interpretation of conservation, a measure of control is justified, he feels that "the Survey as a conservation agency should be more actively engaged in research and experimentation relative to the raising of animals in captivity . . . the present commercial value of fur animals and the future possibilities of the industry demand that greater attention be given to this field." He adds that "it is [not] to be wondered that in all this welter of conflicting views the Survey sometimes loses sight of its chief objective, conservation of

¹ Governmental Problems in Wild Life Conservation. By Robert H. Connery, Ph.D., Instructor, Department of Government, Columbia University. New York Columbia University Press (2960 Broadway, New York City) 1935. Pp. 1-250. Price \$3.25.

wild life as a national resource." Under the subject of reorganization he draws attention to the tangle of confliction in the activities of various Federal groups of which Chief Darling of the Survey has so often spoken and quotes President Hoover to the effect that "our industries and business are badgered to death for duplicate information by a host of non-coordinating agencies."

In his conclusions the author says that the Nation is committed to conservation, that State and Federal Governments seem willing to cooperate and that there are remarkably few legal restrictions to conservation activities. There is need, he says, for more satisfactory data on the subject and defects in administrative organization and "if one were to sum up in a single phrase the greatest problem of conservation in the future it would be how to protect the rights of the many against the greed of the few."

While many instances of political interference with the prosecution of offenders against the game laws are mentioned there is another sort of political interference with conservation which apparently is not given the attention that it deserves doubtless due to the impossibility of obtaining the necessary facts in the case. We, on the outside, cannot but feel that in more than one instance the officers of the Biological Survey have not been able to follow their own judgment in matters of game protection and in limiting control measures, because of pressure from "higher up" instigated by politics. How this is to be prevented it is difficult to say.

It is refreshing to have the whole matter of wild life conservation discussed by someone entirely outside of its activities, someone not interested in either side of the various controversies that have arisen, and someone whose position does not depend upon the attitude that he may take and who is free from political pressure of any sort.

There is such a wealth of historical and legal information in Mr. Connery's book and such an abundance of authoritative references that we hope everyone interested in conservation will read it, especially those who may contemplate improvement in laws or in administration. Furthermore it is written in such a way as to hold one's attention from cover to cover, with a clarity of diction and presentation that is surprising in such a work. The author deserves the thanks of all who are interested in the future of our wild life.—W. S.

The London Convention for the Protection of African Flora and Fauna.—

A special publication of the American Committee for International Wild Life Protection presents a full account of the London Convention composed of representatives of Governments having possessions in Africa, viz.: The Union of South Africa, Belgium, Great Britain, Egypt, Spain, France, Italy, Portugal and the Anglo-Egyptian Sudan. The provisions agreed upon include the protection as complete as possible with special permission to hunt, kill or capture only to further important scientific purposes and only granted by the highest authority in the territory, of a list of seventeen species or groups of mammals and three birds—Shoe-bill Stork, Bald-headed Ibis and White-breasted Guinea Fowl. Thirteen other mammals and nine birds while not so rigorously protected, are not to be hunted, killed or captured without special license from the competent authorities, these birds being the Maribou Stork, Ground Hornbills, Ostrich, Secretary Bird, the several species of Egret and the Buff-backed Heron.

This is the most important move ever made toward the saving of the wonderful fauna of the African continent which was being so ruthlessly decimated by unprincipled hunters and through the opening up of the country. A list of the national parks and game preserves already established by the several governments is appended, most of them complete preserves but on some of them hunting under special permit

is allowed. What will astonish those not in touch with African wild life protection is that there are no less than 148 of these reservations. A few of them are as small as 300 square miles; most of them 50,000 to 100,000 square miles while some reach an area of 600,000 and 800,000 square miles.

This convention has done splendid work and the American Committee deserves credit for presenting the results in such an impressive style. There is a map showing the location of the reserves and pictures of the protected species from drawings by Harold J. Coolidge, Jr., together with a foreword by John C. Phillips, Chairman of the American Committee, who attended the convention as an "observer."—W. S.

Mrs. Dickey's 'Familiar Birds of the Pacific Southwest.'—This attractive little book¹ is designed wholly for the beginner in bird study and those who are only casually interested in birds but who desire to name such as they see in the easiest way, and in her effort to meet this demand the author has been eminently successful.

Only the more familiar species are included and subspecies, if mentioned at all, are referred to incidentally as geographic races while technical nomenclature is conspicuous by its absence, except for a list of the birds treated at the end of the volume where both English and scientific names are given according to the latest A. O. U. 'Check-List'. The author thus avoids the error of trying to combine two methods of treatment in a single work.

At the beginning we have a key based on size and color. The birds are first divided into land and water species and each subdivided according to size; that of a Gull, Dove, Blackbird, Sparrow or Wren, and under each of these are color divisions such as "white," "gray and white" "black," etc. with mention of one or two outstanding characters which lead us to the species.

Following the key are fuller descriptions of the field marks of each bird with a paragraph on habits, etc. chosen with regard for the needs of those for whom the book is intended.

The illustrations are from photographs mainly by the late Donald R. Dickey, husband of the author, whose remarkable skill as a bird photographer is well known. These have been colored by Mrs. Lena Scott Harris and reproduced by the three-color process.

Mrs. Dickey's little book, bound in flexible covers, and adaptable to the pocket should prove a great boon to the nature lover who desires to name the birds he sees in southern California, be he a resident or a visitor from the East, and should stimulate him in following up his study in the several standard works on the subject which are listed by Dr. Casey A. Wood in his brief Introduction.—W. S.

Stuart Baker's 'Nidification of the Birds of the Indian Empire.'—The fourth and concluding volume² of this outstanding work is before us, uniform in every respect with its predecessors. Beginning with the birds of prey it covers the Doves, Sandgrouse, Gallinaceous birds and the several families of "water birds." The accounts of the nesting of the various species are of great interest, especially in the case of birds peculiar to the Indian region and quite unknown to American bird students. The curious Crab Plover (*Dromas ardeola*) found only on the shores of the Red Sea and Indian Ocean excavates a long tunnel under the sand-matted surface of

¹ Familiar Birds of the Pacific Southwest with Size and Color Key. By Florence Van Vechten Dickey. Illustrated with 102 full color reproductions from photographs chiefly by Donald R. Dickey. Stanford University Press, Stanford University, California. Pp. i-viii + 1-241. Price \$3.75.

² The Nidification of Birds of the Indian Empire. By E. C. Stuart Baker, C.I.E., O.B.E., F.Z.S., etc. Volume IV Pandionidae—Podiceptidae with seven plates, London, Taylor and Francis. Red Lion Court, Fleet Street, E. C. 4. 20th June, 1935. Pp. i-xii + 1-546.

the dunes at the end of which is deposited its single egg. The sudden appearance of the large white birds as they popped out of the mouths of their burrows produced a very curious effect from a distance. The great nests of the Black-necked Stork (*Xenorhynchus asiaticus*) we learn, sometimes reach dimensions of six by three feet and in one instance the birds took more than a month in building the structure, using sticks of various sizes from mere twigs to branches two feet in length and two to three inches in diameter. Upon this they placed a rim of clay, descending alternately to a near-by tank and bringing up the mud in their bills and arranging it with great care. There are interesting accounts of nestings of the curious Ibis-bill (*Ibidorhyncha*) which spends its life in the Pamirs, Gilgit and the Tibet region of western China, breeding along the river shores, while the accounts of taking eggs of the Lammergeyer (*Gypaetus*) from high over-hanging cliffs will arouse the enthusiasm of any oölogist. Mr. Baker tells us that of the 2351 forms of Indian birds the nesting of 279 species and subspecies remains quite unknown so that there is still much to learn before the subject is entirely exhausted. In his parting word on egg collecting he says: "No one should start egg collecting unless they have some scientific object in view in so doing. To collect eggs merely to satisfy one's aesthetic sense of the beautiful, or to acquire something which someone else has not got is admittedly not sufficient excuse." He, however, upholds egg collecting where the collector is advancing science and calls attention to the fact that bird photography (and we might add bird-banding) is often quite as detrimental to the birds as egg collecting.

There are seven halftone plates from photographs of nests or scenery.

We congratulate Mr. Baker upon the completion of his labors and his four handsome volumes will stand as a monument to his energy and his knowledge of his subject.—W. S.

Spiker's 'Bird Life of the Finger Lakes of New York.'—This publication¹ is another of the excellent local ornithologies issued by the Roosevelt Wild Station. It covers the region of the famous Finger lakes especially Keuka, Seneca and Cayuga, a region where a number of prominent ornithologists have lived and conducted their investigations—Fuertes at Ithaca; Eaton at Geneva; Burtch and Clarence Stone at Branchport—and is therefore rich in tradition.

Mr. Spiker spent two summers, one winter and a spring in the region and the report is the result of his observations. The accounts are popular in character with brief descriptions of the field marks of the species, and accounts of nests, song and habits, the whole forming a handy pocket ornithology of the area. The illustrations consist of 57 photographs of characteristic spots along the lakes and their vicinity, including the Taushannock Falls which Dr. A. A. Allen has made famous in his photographs of the Duck Hawk.

Beside the value of the pamphlet to local bird students there are many observations of interest on the habits and behavior of various species which are contributions to their life histories.

The author has done a good piece of work.—W. S.

Danforth's 'The Birds of Saint Lucia.'—Dr. Danforth has recently published an excellent monograph² on the birds of Saint Lucia. As he points out we have no

¹ A Popular Account of the Bird Life of the Finger Lakes Section of New York, with Main Reference to the Summer Season. By Charles J. Spiker, Field Naturalist, Roosevelt Wild Life Station. Roosevelt Wild Life Bull., Vol. 6, No. 3. Pp. 391-551, Figs. 228-284. July, 1935.

² The Birds of Saint Lucia. By Stuart Danforth, Prof. of Zoology and Entomology, College of Agriculture, University of Puerto Rico. Monographs of the Univ. of Puerto Rico, Series B., No. 3, 1935. Pp. 1-129. Pl. I. To be had from the Librarian of the University, Rio Piedras, P. R.

complete work on the avifauna of any of the Lesser Antilles and in attempting to meet this deficiency he has selected Saint Lucia because of the number of its endemic forms and peculiar genera, and because of the threatened extinction of several of the species. He has collected all of the published information on the birds of the island as well as some unpublished material and spent a month during the summer of 1931 in a personal study of the avifauna. Under each of the eighty species and subspecies found on the island are given references to Saint Lucia occurrences, a brief description sufficient to distinguish it from other birds of the island and an account of its habits and distribution.

In addition there is a sketch of the physiography of Saint Lucia, a list of collecting localities, a history of ornithological research on the island and a bibliography.

There are no less than sixteen endemic forms in the avifauna and twenty-two migrants from North America. The nomenclature follows "the current scientific name" but this is not always easy to determine and apparently in making a last minute change from the A. O. U. 'Check-List' to that of Peters' the genus *Tringa* is divided in two by *Caloptrophorus*!

There is a colored plate from a rather crude painting of a pair *Melanospiza richardsoni* by F. W. Horne, but the colors of the birds are accurately presented. Dr. Danforth is to be congratulated upon a good piece of work which should arouse interest among the residents in their birds and in the rigid protection which they apparently need.—W. S.

Birds of Jehol.—This publication¹ constitutes a part of the 'Report of the First Scientific Expedition to Manchoukuo' and is the joint product of five of Japan's leading ornithologists. The Passeres are by Dr. N. Kuroda and Marquis Yamashina; the lower orders by Prince Taka-Tsukasa and Marquis Hachisuka; and the "résumé" by Dr. Uchida, who also supervised the making of the plates.

The collection made by Messrs. Kishida and Mori contained seventy species and subspecies one of which *Passer montanus tokunagai* Kuroda and Yamashina (p. 87) is described as new, and named after the leader of the expedition.

There are 28 full page color plates by Kobayashi, decidedly the best that he has produced and while he has changed the body position of some of his birds he seems to be unable to get away from the profile view so far as the head is concerned.

The text is in duplicate being presented first in Japanese and then in English with apparently little reduction except for the omission of the synonymy and the measurements of the specimens.

The publication is creditable to all concerned.—W. S.

Wild Life Management in the National Parks.—The second number² of the "Fauna Series" of National Park Publications consists of various reports mostly by George M. Wright and Ben H. Thompson on various aspects of wild life conservation in the parks. Those most concerned with birds are two by Wright on 'Men and Birds in Joint Occupation of National Parks' and 'The Primitive Persists in Bird Life of Yellowstone Park.' In the first he lists as infringements of birds upon man's rights—Woodpeckers disturbing visitors to the hotels, and other birds stealing

¹ Report of the First Scientific Expedition to Manchoukuo under the Leadership of Shigeo Tokunaga, June-October, 1933. Sect. V, Div. II. Part III. Birds of Jehol. By Prince N. Taka-Tsukasa, Marquis M. Hachisuka, N. Kuroda D.Sc., Marquis Y. Yamashina, S. Uchida, D. Agr. April, 1935. Pp. 1-91, pls. I-XXVIII.

² Fauna of the National Parks of the United States. Wild Life Management in the National Parks. By George M. Wright and Ben H. Thompson. Fauna Series No. 2. July, 1934. Washington, 1935. Pp. i-viii + 1-142. Price 20 cts. (from Supt. of Documents, Washington, D. C.)

lunches, both of which have now been dismissed from consideration although some serious requests for the birds' destruction on these scores have been made in the past! The case of the Pelican taking trout that the fishermen regarded as their game has been met by restocking the lakes rather than destroying the birds.

Of offences of man against the birds are oiling of waters to dispose of mosquitos which resulted in the killing of certain birds and destroying feeding grounds, and the intrusion by park visitors upon the colonies of breeding Pelicans and other colony-nesting species. Mr. Wright quite properly thinks that those wishing to visit national parks will have to put up with such inconveniences as mosquitos and must be excluded from nesting rookeries, although plans can be perfected whereby large numbers of rookery birds may be seen on their feeding grounds and their evening flight back to the rookeries witnessed with ease.

'Men and Mammals' in the parks forms another interesting chapter as does Williams' account of the 'Kaibab Deer Fiasco' where the killing off of the Pumas so increased the deer that they consumed all the forage and it will take fifty years of careful management to cover the scars of the fiasco. The surplus of deer have meanwhile been killed off.

There are many other interesting discussions and many attractive photographs in this little volume.—W. S.

Year Book of the Indiana Audubon Society.—This annual,¹ always rich in bird lore, opens this year with a sketch of T. Gilbert Pearson by Robert P. Allen. There is an interesting article on 'Some of the Large Birds of Indiana' by W. P. Allyn, with photographs of adult and young of the Black and Turkey Vultures. 'Robin Notes' by Earl Brooks and Grant Henderson, the latter presenting evidence of a single Robin attending two nests. Five nests were located in successive buckets of an elevator and two which were side by side contained two eggs each, the others being unfinished. Sidney R. Esten presents a table of migration data for Fort Wayne, Ind., compiled during many years by the late Charles A. Stockbridge. The Society is making a strong movement to prevent the placing of the Mourning Dove on the list of game birds.—W. S.

Third Report of the Hawk and Owl Society.—This publication like its predecessors is full of information regarding the progress of movements for the preservation of these birds. There is much information upon the Hawk Mountain controversy which has fortunately subsided for the present and the protection of the birds given first consideration.

Mr. Alexander Sprunt, Jr., has an interesting report on the Hawk conditions in the South with a list of species observed.

Mr. Warren Eaton, prime mover in the organization of the Society has, as is generally known, been taken on to the staff of the National Association of Audubon Societies in charge of Hawk and Owl protection and Mr. Charles K. Nichols takes his place as Secretary. All contributions in aid of the Hawks and Owls should be sent to the Treasurer, Colvin Farley, 2 Martine Ave., White Plains, N. Y.—W. S.

Snyder on the Sharp-tailed Grouse.—Mr. Snyder has gathered together in this study² of the Sharp-tailed Grouse (*Pedioecetes phasianellus*) a vast amount of information on the cyclic abundance of the species and its habits, followed by a more detailed account of the 1932 emigration of the northern race through Ontario and Quebec, with observations on the behavior of the migrating birds the possible causes

¹ The Audubon Year Book, Vol. XIII. Price \$1.00 (H. A. Zimmerman, 915 W. Gilbert St., Muncie, Ind.).

² A Study of the Sharp-tailed Grouse. By L. L. Snyder. Contributions Royal Ontario Museum of Zoology No. 6. (Reprinted from Univ. Toronto Studies Biol. Ser. No. 40) 1935. Pp. 1-66.

of the flight and the ultimate fate of the migrants. The question of the fluctuation in the numbers of game birds is one that attracts much interest at the present time and we have in this paper of Mr. Snyder's a valuable contribution to the subject.

Following the discussion of the emigration he presents a taxonomic study of the Sharp-tailed Grouse in which he endorses the recognition of *P. p. kennicottii* (Suckley) from the far northwest, as recently proposed by DuMont and suggests the possibility of still another separable race in the grove belt of the Prairie Provinces. In a subsequent paper,¹ with additional material at his command, this race is formally named *P. p. campisylvicola* (p. 4) type locality, near Winnipeg, Manitoba. The status of *P. p. jamesi* Lincoln, with a very small range at the southern extremity of the *P. p. campestris* territory is left for future determination.—W. S.

Hibbert-Ware on the Little Owl.²—This is a thoroughly satisfying account of the food habits of the Little Owl based on the analyses of thousands of pellets, and on the contents of larder holes where food is prepared for the young. This Owl is a ground feeder and "the staple food of the adult bird at all seasons of the year consists of mice, voles, rats, shrews, beetles, insect larvae, and earthworms. The remains of birds occur very sparsely." The young are "reared almost entirely on mice, voles, earthworms, and soft larvae."

Analyses of the gizzard contents of seven of the birds killed because they were thought to be doing harm are presented, and in no case bear out the suspicion of wrongdoing. In so "vermin"-conscious a country as England the Little Owl naturally fell under suspicion, but in these studies the author found no case of depredations either upon game birds or poultry, and knows of only one authentic record of such damage. The author presents a summary giving the species a highly creditable record, and Dr. Walter E. Collinge, the well-known English Economic Ornithologist, supplies a postscript to the effect that from the nature of its food "the Little Owl must be regarded as of great value to the agriculturist. As a factor in the destruction of injurious insects and voles and mice it is a most valuable ally."—W. L. M.

The A. O. U. 'Pocket Check-List.'³—There has recently been published by the Union a pocket edition⁴ of the 'Check-List' based on the fourth edition of the regular 'Check-List' with no change whatever in the names. The technical and English names and the A. O. U. number of each species and subspecies are given and the list is printed on one side of the paper so that it may be used for labelling, for field lists, for "life lists" and various other purposes. There are convenient indexes to the numbers and to the family names and English group names. While of the same size as the former pocket list, of 1910, this one is printed in somewhat larger type with all names of higher groups included and thus covers more than twice the number of pages. It is sold at cost price and should be in great demand as a convenient reference book for one desiring the current technical name of any North American bird as well as for the purposes already mentioned. Dr. Alexander Wetmore, Chairman of the Committee on Classification and Nomenclature of North American Birds is responsible for both the compilation and editing of the list and has given us an excellent piece of work.—W. S.

¹ A Revision of the Sharp-tailed Grouse with a Description of a New Race. By L. L. Snyder. Occas. Papers Royal Ontario Mus. Zool., No. 2. July 30, 1935. Pp. 1-9.

² Hibbert-Ware, A., The Little Owl. An Examination of its Food Habits, Reprint 3 pp. (16 x 22 cm.) from School Nature Study, Feb. 1935.

³ Abridged Check-List of North American Birds. From the Fourth Edition of the A. O. U. Check-List. American Ornithologists' Union, Washington, D. C., 1935. Size 3¼ by 5¾ inches. Pp. 1-177. Price 50 cents. Address W. L. McAtee, 3200 22d St., Cherrydale, Va.

Other Ornithological Publications.

Barbour, Thomas.—Cuban Red-tailed Hawk. (Occas. Papers. Boston Soc. Nat. Hist., Vol. 8, pp. 207–208, July 24, 1935.)—*Buteo borealis solitudinis* (p. 207) Soledad, Cuba.

Brodkorb, Pierce.—A New Ovenbird from Paraguay. (Occas. Papers Mus. Zool. Univ. Michigan, No. 316, May 29, 1935.)—*Phacellodomus rufifrons fargoi* (p. 1), Horqueta.

Brodkorb, Pierce.—Two New Subspecies of the Red-shafted Flicker. (Occas. Papers Mus. Zool. Univ. Michigan, No. 314, May 29, 1935.)—*Colaptes cafer canescens* (p. 1) Bear Lake Co., Idaho and *C. c. chihuahuae* (p. 2) Mifaca, Chihuahua.

Chasen, F. N.—Noteworthy Records of Birds from Perak. (Bull. Raffles Mus. Singapore, No. 9, December, 1934.)

Chasen, F. N.—Nine New Races of Natuna Birds. (Bull. Raffles Mus., No. 9, December, 1934.)

Delacour, J.—Observations on Brazilian Birds Rare in Captivity. (L'Oiseau, No. 2. 1935.) [In French.]

Erwin, W. G.—Some Nesting Habits of the Brown Thrasher. (Jour. Tennessee Acad. Sci., X, No. 3, July, 1935.)—A notable paper covering the nesting activities of nine and ten pairs of Thrashers on two consecutive years in the same locality. Great attention is given to the structure of the nest and the part played by both birds in its building, materials used, number of trips to the nest, etc. Then follows a consideration of incubation and care of the young, before and after leaving the nest, with abundant data. The average incubation period for seventeen nests was 12 days. No less than 197 eggs were under observation during the study and more scientific information, we are sure, was secured than has been obtained from the thousands of Thrasher eggs in the combined collections of the "oölogists" of America!

Fleming, J. H.—A New Genus and Species of Flightless Duck from Campbell Island. (Occas. Papers Royal Ontario Mus. Zool., No. 1, June 22, 1935.)—*Xenonetta nesiotis* (p. 1). This remarkable bird is related to *Nesonetta* of the Auckland Islands and to *Elasmonetta* of New Zealand with which Mr. Fleming has carefully compared it. It seems to have very distinct characters and it is rather remarkable that it has not previously been described. His specimen was secured by Capt. J. Fairchild of the ship "Stella" in 1886.

Goodwin, George G.—Winged Monarchs of the Air. (Natural History, June, 1935.)—An interesting account of falconry.

Lowery, George H.—The Ivory-billed Woodpecker in Louisiana. (Proc. Louisiana Acad. Sci., II, No. 1, March, 1935.)—A detailed account of the rediscovery of the bird on the Tensas River, La.

Martin, Alec C.—Quail-food Plants of the Southeastern States. (Circular 348 U. S. Dept. Agr., April, 1935.)—45 species listed with figures of many of them for popular recognition.

Pickwell, Gayle.—Birds (Science Guide for Elementary Schools). An excellent guide for teachers in the California schools to assist in preparing talks and conducting elementary courses in ornithology.

Roberts, Austin.—Museums, Higher Vertebrate Zoology and their Relationship to Human Affairs. (Published by the Carnegie Visitors' Grants Com., Pretoria, South Africa.)—An account of his visit to the museums and other scientific institutions of the United States and his impressions. It is interesting to learn that the small number and variety of birds in the Eastern States greatly impressed him and

he is convinced that the losses in grain and fruits are in no way comparable to those incurred in South Africa where birds are so much more numerous.

Ross, Roland C.—A New Genus and Species of Pigmy Goose from the McKittrick Pleistocene. (Trans. San Diego Soc. Nat. Hist., VIII, No. 15, August 24, 1935.)—*Anabernicula gracilentia* (p. 107).

Scheffer, Theo. H. and Cottam, Clarence.—The Crested Myna, or Chinese Starling, in the Pacific Northwest. (Tech. Bull. U. S. Dept. Agr., No. 467, April, 1935.)—Introduced apparently in 1897 the bird has not spread to any extent beyond the environs of Vancouver. Its habits and food are considered in detail and the possibility of its spreading into the state of Washington discussed.

Schuster, Josef, and Others.—Twentieth annual report of the 'Lotos' Ornithological Station at Leipa, Austria. [In German.]—Lists of species observed and details of banding operations.

Shaw, Tsen-Hwang.—Glimpse on the Bird Life of Hwailai. (Bull. Fan. Mem. Inst. Biology, VI, No. 3, March, 1935.)—In Charhar Province near Peiping; a list of 51 species.

Shaw, Tsen-Hwang.—Preliminary Observations on the Fossil Birds from Chou-kou-tien. (Bull. Geol. Soc. of China, XIV, No. 1, 1935.)—The locality of the collection here described is not clearly indicated. Some of the specimens and identified as to species others only to genera. None is described as new.

Strecker, John K.—Notes on the Zoology of Texas. (Baylor Bulletin, XXXVIII, No. 3, August, 1935.)—Unpublished manuscripts of the late John Kern Strecker. While most of these deal with reptiles the following are ornithological: On the Summer Birds of West Frio Canon, Real Co., Texas; Further Notes on the Birds of McLennan Co., Texas; and a list of species from Bowie Co., Texas.

Stresemann, Erwin.—Status and Problems of Ornithology. (Der Biologe IV, Heft 7, 1935.) [In German.]

Stresemann, Erwin and Paludan, K.—On a Small Bird Collection from the Merauke District of Southeastern New Guinea. (Mitteilung. Zool. Mus. Berlin, XX, Heft 3, 1935.) [In German.]

Van Rossem, A. J.—The Mangrove Warbler of Northwestern Mexico. (Trans. San Diego Soc. Nat. Hist., VIII, No. 10, August 24, 1935.)—*Dendroica erithacorides rhizophorae* (p. 1) Tobari Bay, Sonora.

Van Rossem, A. J.—A New Race of Brown Towhee from the Inyo Region of California. (Trans. San Diego Soc. Nat. Hist., VIII, No. 11, August 24, 1935.)—*Pipilo fuscus eremophilus* (p. 70) Mountain Springs Canyon, Inyo Co., Calif.

Wing, Leonard Williams.—Wildlife Cycles in Relation to the Sun. (Trans. 21st Amer. Game Confer., 1935.)—This is an elaboration of the author's paper in 'The Auk' for 1924. As summarized his contentions are that certain rhythms in migration dates and population levels correspond not only with each other but with a rhythm in radiations from the sun and also a rhythm in reproduction.

Zimmer, John T.—Studies of Peruvian Birds XVII. (Amer. Mus. Novitates, No. 785, March 18, 1935.)—Notes on the genera *Syndactyla*, *Anabacerthia*, *Philydor* and *Automolus*, five new subspecies are described.

The Ornithological Journals.

Bird-Lore. XXXVII, No. 4. July-August, 1935.

The Proposed Kings Canyon National Park. By Ben H. Thompson.—The proposal to establish this wonderland of California as a park has brought out violent opposition from grazing, lumbering and other interests which seem to have checked any further consideration. Mr. Thompson analyses both sides of the question and makes a valiant plea for the preservation of this beautiful country for the enjoyment of the many instead of sacrificing it to the greed of the few.

Naturalist, Artist, Author and Educator. By Frank M. Chapman.—An appreciation of Ernest Seton, with portrait.

A Water-Thrush Family. By Lawrence H. Walkinshaw.—An illustrated account of *Seiurus motacilla* in Michigan.

The Depression Army Takes to the Woods. By Warren F. Eaton.—A most instructive account of the terrible mistakes of the CCC operations whereby, through failure of any instruction or competent supervision, game cover has been destroyed, woodland thinned out, marshes drained, unnecessary roads cut into areas formerly reached only by trail, etc., etc. As a result many rare botanical treasures have been destroyed, wild life has been poisoned (even in Pennsylvania!), "vermin" killed off and much of the beauty of nature ruined.

We can add that in the New Jersey pine barrens, unnecessary roads have been made and undergrowth cut down permanently destroying not a little of the peculiar native flora, while a great camp has just been established for the draining of the Dennisville marshes one of the greatest resort for shore-birds in the southern part of the state.

Shore-Birds and Closed Seasons. By Charles A. Urner.

A beautiful drawing of Willets by R. T. Peterson adorns the cover.

The Condor. July-August, 1935. XXXVII, No. 4.

Bird Life at Horst Lake, British Columbia. By J. A. Monro.—Considered ecologically.

The Changing Distribution of the Western Mockingbird in California. By John R. Arnold.

Systematic Status of Some Northwestern Birds. By Harry S. Swarth.—Presents arguments to show that *Tringa solitaria cinnamomea* and *Falco columbarius bendirei* are not recognizable and possibly *F. c. suckleyi* (as an example of melanism) and *Dendroica aestiva rubiginosa*, are in the same category. *Vermivora celata orestera* on the other hand he regards as a perfectly good race.

H. B. Conover describes a new race of Ruffed Grouse from Vancouver Island.—*Bonasa umbellus brunnescens* (p. 204) and Hildegard Howard a new fossil Eagle from Nevada, *Spizaetus willetti* (p. 206).

The Wilson Bulletin. XLVII, No. 2. June, 1935.

A Study of the Nesting and Family Life of the Red-throated Loon. By R. A. and Hazel S. Johnson.—On the north side of the Gulf of St. Lawrence.

The Constancy of Catbirds to Mates and to Territory. By Geoffrey Gill.

Forest Edge Birds and Exposures of their Habitats. By J. R. Carpenter.

Notes on Nestling Robins. By W. J. Hamilton, Jr.—Ten birds averaged 6.6 grams at hatching and 56 gr. on their fourteenth day, when they left the nest.

The Duck Situation in the Prince Albert District, Central Saskatchewan. By O. C. Furniss.

Erythrocytes and Hemoglobin in the Blood of Some American Birds. By L. B. and Margaret M. Nice and Ruth M. Kraft.

Food Habits of Burrowing Owls in Northwestern Iowa. By Paul R. Errington and Logan J. Bennett.

Bird Migration Records from Southeastern Wyoming. By Otto McCreary and Arthur B. Mickey.—Compiled from personal observation and various publications. It is virtually a complete list of the avifauna.

The Murrelet. XVI, No. 2. May, 1935.

Destruction of Red Phalaropes. By Ira N. Gabrielson.—In the storm on North Pacific coast in October, 1934.

Duration of Insect Remains in the Stomachs of Birds. By W. L. McAtee.

The Oölogist. LII, Nos. 4-8. April to August, 1935.

Tulsa Oklahoma Nesting Dates. By H. A. Yocum. (April.)

Egg Collecting in Massachusetts. By H. O. Green.—Near Wakefield. (May.)

Nesting of the Wood Duck in Southern New Jersey. By Frederick B. Phillipp. (May.)

Eureka Springs Arkansas 1935 Data. By Clell Jay. (June.)

Afield in North Dakota. By Frederick B. Phillipp. (July.)

A Day in North Dakota. By Louis B. Bishop.—“A tale of days that are past.” (August.)

Bird Banding. VI, No. 3. July, 1935.

Studies of Warbler Migration near Canton, Ohio. By Howard W. Braun.

Edmund Selous—An Appreciation. By Margaret M. Nice.

House Sparrow Replacement and A Severe Winter. By John T. Nichols.

Mrs. Nice on Territory. By Francis H. Allen.—A review.

The Cardinal. IV, No. 2. July, 1935.

A Study of the European Starling. By Lawrence E. Hicks and Charles A. Dambach.—Study of the range of a colony near Zanesville, Ohio.

Audubon's Sesquicentennial. By Francis H. Herrick.

Audubon and Bakewell Partners.—A sketch of the life of T. W. Bakewell written by himself with extracts from letters bearing on the above partnership and Audubon's failure as a business man. A most interesting item even though not very creditable to the ornithologist!

A Raven's Nest. By Bayard H. Christy.—In central Pennsylvania.

The Nebraska Bird Review. III, No. 3. July, 1935.

Some Experiences with the Northern Purple Martin. By Mrs. George W. Trine.

A History of Nebraska Ornithology. By Myron H. Swenk.—The Lewis and Clark and Pike Expeditions. There is an interesting map showing the Nebraska camps of the former and a list of twenty species of birds mentioned as seen in the state.

Iowa Bird Life. V, No. 2. June, 1935.

The 1934 Drought and Southern Iowa Bobwhite. By Paul L. Errington.

Blue Geese in Iowa. By William Youngworth.

Iowa Bird Life. V, No. 3. September, 1935.

Brenton's Slough. A Waterfowl Breeding Area. By Kate E. La Mar.

Distinctive Places in Iowa for Bird Study and Private Bird Collections in Iowa. By Philip A. DuMont.

The Migrant. VI, No. 2. June, 1935.

An April Visit to the Reelfoot Crane-towns. By Franklin McCamey.

In Search of the Duck Hawk. By Bruce P. Tyler.—The author's etymology of the Latin name of the bird is a little at fault; instead of *anatum* being derived from *an* (up) and *temno* (to cut) we should regard it as the genitive plural of *anas*, i. e. “of ducks.”

Goose pond and its Marsh Birds. By Albert F. Ganier.

Water Birds of East Tennessee. By James Trent, Jr.—An annotated list.

The following mimeographed journals furnish much information on birds of the regions of which they treat and are of great value in keeping bird students of their several areas in touch with one another. Articles of more general interest are listed below.

Inland Bird Banding News. (Edward R. Ford. Chicago Academy of Sciences.)

Banding Experiences with Cowbirds. By Margaret M. Nice. (June issue.)

Recoveries of Great Blue Herons. By Karl E. Bartel. (June issue.)

News from the Bird Banders. (Mus. Vert. Zool. Berkeley, Calif.)

Hummingbird Orphanage. By J. J. Parsons. (July.)

Scale-eating Birds. By H. and J. R. Michener. (July.)

Jack-Pine Warbler. (Kent Scientific Mus., Grand Rapids, Mich.)

Nature Study in the Schools. By B. A. Walpole. (July.)

Long Island Bird Notes. (Woodmere Academy, Woodmere, N. Y.)

A weekly résumé of field observations of scholars and teachers.

The Night Heron. (J. O. Felker, 8 Fair Oaks, St. Louis Co., Mo.)

Lists of Missouri nesting birds. (May.)

The Prothonotary. (H. D. Mitchell, 378 Crescent Ave., Buffalo, N. Y.)

Detailed observations of members of the Buffalo Ornithological Society. (June, July and August.)

The Raven. (Virginia Society of Ornith., J. J. Murray, Lynchburg, Va.)

Seven Years of Systematic Bird Study on One Farm. Berthe Daniel. (May.)

A Nesting Diary for Amelia Co., Va. By John B. Lewis. (June.)

Distribution of the Ruffed Grouse in Virginia. By C. C. Handley. (July–Aug.)

Notes on Birds of the Blue Ridge. By Ruskin R. Freer. (July–Aug.)

Hérons along the Potomac. By W. B. Mellwaine. (July–Aug.)

The Redstart. (Brooks Bird Club, Oglebay Park, Wheeling, W. Va.)

Nesting of the Hermit Thrush in West Virginia. By Russell West. (July.)

On the Olive-backed Thrush in West Virginia. By A. B. Brooks. (August.)

Nesting of the Virginia Rail at Beech Bottom, W. Va. By Charles Conrad. (August.)

Breeding of the Mourning Warbler in W. Virginia. By Paulinebelle Wyss. (August.)

Saint Louis Bird Club Bulletin. (L. M. Weber, 3006 Elliot Ave., St. Louis, Mo.)

Snowy Egret. (H. A. Olsen, 172 Manchester St., Battle Creek, Mich.)

Preliminary List of the Breeding Birds of Ohio. By Lawrence E. Hicks.

Birds Observed During 1934 [in Michigan]. By M. B. Trautman.

Similar Lists by R. E. Olsen, Mr. and Mrs. N. Theodore Peterson, M. Bryan and others. All of the above in the undated issue, Vol. IX, No. 2.

The Ibis. (13 series) V, No. 3. July, 1935.

The Birds of Northern Portuguese East Africa. By Jack Vincent. (Part VIII.)

Some Nesting Notes from the Savannas of the Rupununi District, British Guiana. By T. A. W. Davis.

Critical Notes on Central American Birds in the British Museum. By Ludlow Griscom.—A review of *Crypturellus cinnamomeus* with *C. boucardi blancaneauzi* (p. 543) British Honduras, proposed as new; notes on New World Skimmers, *Rynchops nigra oblita* (p. 545) Pacific coast of Guatemala, as new; notes on Middle American Horned Owls—all described forms are identical with *Bubo v. mayensis*

Nelson; a review of *Dendroica graciae* Baird, *D. g. remota* (p. 548) described as new from Nicaragua; the following are described from Guatemala: *Otus flammeolus guatemalae* (p. 549), *Elainea obscura ultima* (p. 550), *Vireolanius melitophrys quercinus* (p. 551) and *Certhia familiaris pernigra* (p. 552) and from Nicaragua, *Columba fasciata parva* (p. 553).

Some Further Notes on the Birds of Portugal. By C. B. Ticehurst and H. Whistler.

Further Notes from Southwestern Transylvania. By Major W. Maitland Congreve.

Systematic Notes on the Manx Shearwater. By G. M. Mathews.—*Puffinus opisthomelas* and *auricularis* are regarded as subspecies of *P. puffinus* as already suggested by Murphy.

On the Handsome Francolin (*F. nobilis*). By C. H. B. Grant and C. W. Mackworth-Praed.

The Newfoundland Gannet Colony with Recent Information on the other North American Gannetries. By V. C. Wynne-Edwards.—With a photograph and a map.

On a Collection of Birds from Northwestern Abyssinia. Part III. By R. E. Cheesman and W. L. Slater.

Notes on a Collection of Eggs and Breeding-habits of Birds near Lokoja, Nigeria. By Rev. F. C. R. Jourdain and R. Shuel.

British Birds. XXIX, No. 1. June, 1935.

Nesting of the Hawfinch. By G. R. Bird.—With photographs.

Report on the Swallow Enquiry 1934. By A. W. Boyd.—Summary of replies to questions as to size of broods of the Common Swallow (*Hirundo r. rustica*) in different months and localities, considering altitude, type of agriculture and whether rural or urban; and many other subjects.

British Birds. XXIX, No. 2. July, 1935.

Field Notes on the Coot. By G. C. S. Ingram and H. M. Salmon.—Includes tables of number and duration of dives.

Remarkable Spring Migration of Manx Shearwaters and Other Sea Birds off Cape Cornwall. By W. H. Thorpe.

Observations on Times of Feeding. By George Marples.—With time before and after sunrise that various species began to feed and a time chart for the Tits.

Recoveries of Banded Birds.

In the short notes is an account of some 600 Wagtails roosting on the glass roof of a post office from February to May.

British Birds. XXIX, No. 3. August, 1935.

Notes from the Isle of Man. By P. G. Ralfe.

Recovery of Banded Birds.

Bulletin of the British Ornithologists' Club. CCCLXXXVII. May 28, 1935.

The Extent to which captivity modifies the habits of birds, was discussed by the Marquess of Tavistock. David Bannerman exhibited some rare birds obtained by W. P. Lowe and Miss Waldron in Ashanti. N. B. Kinnear and G. L. Bates described a new Woodpecker from Arabia as *Desertipicus* (genus nov.) *dorae* (p. 156). G. M. Mathews describes three new races from Australia and New Zealand. There was discussion on the meaning of the amendment to Art. 25 of the International Code of Nomenclature.

Bulletin of the British Ornithologists' Club. CCCLXXXVIII. July 3, 1935.

Rev. F. C. R. Jourdain described his recent visit to Egypt and Palestine; David Bannerman presented notes on birds of Nigeria; and N. B. Kinnear on Arabian birds collected by H. St. John Philby.

Jack Vincent described two new African races; C. B. Ticehurst two from Yakut and Burma while G. M. Mathews discussed the races of *Apteryx* and described *Stictapteryx owenii iredalei* (p. 180).

The Oologists' Record. XV, No. 2. June, 1935.

Bird Notes on Lapland Trips. By E. C. Stuart Baker.

The Eggs of Wahlberg's Eagle and of *Accipiter melanoleucus*. By C. R. S. Pitman.

The Birds of Churchill, Manitoba. By K. L. S.

The Avicultural Magazine. (IV series) XIII, Nos. 6, 7 and 8. June, July and August, 1935.

Notes on the Birds of Fiji. By Sydney Porter (continued). (July.)

Breeding of Courier Water-Tyrant (*Fluvicola climazura*). By J. Delacour. (July.)

The Greenfinch in Captivity. By E. Hopkinson.—With a list of hybrids.

Notes on a Voyage Home from Africa in the Winter. By J. C. Swan. (July.)

Bermudan Notes. By Sydney Porter. (August.)

A discussion of the ban upon importation of Parrots and its ultimate effect on aviculture appears in both July and August.

Bird Notes and News. XVI, No. 6. Summer, 1935.

The Bird Life of Java. By G. B. Gloyne.

Bird Sanctuaries and many short articles on bird conservation.

The Emu. XXXV, Part 1. July, 1935.

Field Notes on the Australian Pratincole. By R. F. Bailey.

Nesting of the Brown Weebill (*Smicrornis brevirostris*). By J. N. McGilp.

Lagoons and Bird Protection. By Spencer Roberts.—Cattle make the borders of the lagoons impossible as nesting places for the numerous water birds which frequent them; it is suggested that a small sector should be fenced off as a reservation for the birds.

The Seasonal Movements of Birds of Eastern New South Wales. Part III. By P. A. Gilbert.

Birds in the Great Australian Bight. By D. L. Serventy.

Additions to the Birds of Mansfield, Victoria. By A. E. Bridgewater.

On the Birds of the McPherson Ranges. Part II. By A. J. Marshall.

Avian Psychology. By N. L. Roberts.

The Food of Australian Birds. By A. M. Lea and J. T. Gray. Part II.—A mass of detailed observations, on many species.

Major H. M. Whittell has a review of the two volumes of Peters' 'Check-List.' He is evidently not acquainted with the A. O. U. 'Check-List' as several of the generic changes attributed to Peters really originated in that work.

The South Australian Ornithologist. XIII, Nos. 2 and 3. April and July, 1935.

Healed Fracture in Forearm of Pelican. (April.)

Pacific Gull (*Gabianus pacificus*). By J. Sutton. (April.)

Extracts from Verco's 'Combing the Southern Seas' on the Avifauna of St. Francis Island. (April.)

The Colour Variations of the Budgerygah (*Melopsittacus undulatus*) their Origins and Genetic Relationships. By S. E. Terrill. (July.)

Acclimatization in South Australia. By J. Sutton.—List of species introduced at various times compiled from records, newspapers, etc. (July.)

Alauda. (III ser.) VII, No. 2. April-June, 1935. [In French.]

A Contribution to the Ornithology of Northeastern Siberia. By G. P. Dementieff.

Ornithological Notes from the Department of Haute-Savoie. By Robert Poncey.

A Contribution to a Study of the Food of Aquatic Birds. By Paul Madon.—Rails and Herons.

Notes and Observations on the North African Crossbill (*Loxia curvirostra polio-gyna*). By R. Le Du.

On the Reproduction of *Phylloscopus sibilatrix* and *P. bonelli* in Sologne. By the Marquis de Tristan.

Report on Tunisian Ornithology for 1934. By G. de Guirtchitch.

Remarks on the Distribution and Biology of *Bonasia b. rupestris* in Eastern France. By Henri Heim de Balsac.

Observations on the Egg-laying of the Warblers, *Acrocephalus scirpaceus* and *A. palustris*, parasitized by the Cuckoo. By A. Julien.

LeGerfaut. XXV, Fasc. 1. 1935. [In French.]

Some Interesting Ornithological Findings in Middle and Western Siberia. By W. N. Scalon and A. A. Sludsky.

A Glance in Retrospect at the Buzzard, *Buteo buteo buteo*. By Ch. Dupond.—Variations in plumage and nomenclature.

Birds of Southern Taimir. By W. N. Scalon.

Banded Bird Recoveries.

Journal für Ornithologie. Jahrg. 83, Heft 3. July, 1935. [In German.]

Companionship in the Bird's World. By Konrad Lorenz.—Companionship of the young; race companionship; social companionship; companionship with brothers etc.

Yearly Cyclic Variation in the Structure of the Thyroid Gland in Birds. By Werner Küchler.

Home Finding Experiments with Starlings in 1934. By Werner Rüppell.—Some thirty-six lots of Starlings liberated from 44 to 600 kilometers from their nests with detailed tabulation of returns etc. and discussion at length. One travelled 405 km. in a little less than 10 hours. Only 120 out of a total of 353 returned at all.

Ornithologische Monatsberichte. Jahrg. 43, No. 3. May-June, 1935. [In German.]

Gatke's Bluethroat. By O. Kleinschmidt.

Hypnotic Reaction in Birds. By F. Steiniger.

Some Observations on the Nest of *Motacilla f. flava*. By H. Ringleben.

The Systematic Position of the Tibetan Gull (*Larus brunneicephalus*). By B. Stegman.

Observations on the Swan status in the Nordenburg Lake, East Prussia, since its Stocking with *Cygnus olor*. By W. von Sanden.

On the Tongue Structure of South African Woodpeckers. By J. Steinbacher.

Ornithologische Monatsberichte. Jahrg. 43, No. 4. August-July, 1935. [In German.]

On Frog Feeding by Owls. By Helmut Schaefer.

The Papuan Forms of *Accipiter fasciatus*. By E. Stresemann.—Two recognized. Shorebird Migration in Binnenland. By O. Natorp.

In the Short Notes are described *Galerida cristata apuliae* (p. 119) Southern Italy, by A. v. Jordans; and *Apalis flavida tenerrima* (p. 119) Mikindani, German East Africa, by H. Grote.

Der Vogelzug. VI, No. 3. July, 1935. [In German.]

Migration of the Arctic Loon (*Colymbus a. arcticus*). By E. Schüz.

On Mass Sleeping-places of the White Wagtail (*Motacilla alba*). By L. Schuster.

A Short Explanation of the Influence by Gonads, Thyroid and Pituitary on the Bird Body. By P. Putzig.

Two New Contributions to our Knowledge of the African Migration of the Western Stork. By E. Schüz.

Day Migration of the Snipe. By H. Sick.

Beiträge zur Fortpflanzungsbiologie der Vögel. II Jahrg., No. 4. July, 1935. [In German.]

On the Breeding Life of the Red Kite. By G. Thiede and A. Zänkert.—With excellent photographs.

Birds' Eggs from New Britain. By M. Schönwetter.

Food of a Delayed Brood of Barn Owls. By G. Creutz.—1000 mice, 300 shrews and 89 birds of which 85 were Sparrows!

Archives of Swiss Ornithology. I, Fasc. 6. August, 1935. [In German or French.]

The Dipper and its Subspecies in Switzerland. By Julius Troller.—*Cinclus cinclus montanus* (p. 198) from the Alps is described.

A Contribution to a Study of the Geographic Variation of *Sitta europaea* in Western Europe. By Noel Mayaud.

On the Migration of *Anas querquedula* and *A. crecca* in Switzerland. By U. A. Corti.—With charts and much detail.

Der Ornithologische Beobachter. Jahrg. 32, Heft 7. April 1935. [In German or French.]

New Investigations on the Food of the Grebe *Podiceps cristatus*. By W. Knopfli.

Remarks on the Digestion of the Grebes. By O. Meylan.

Investigations on the Food of *Podiceps ruficollis*. By H. Noll and J. Schmaltz.

The June issue of this journal is devoted to a study of the migration of various Ducks in Switzerland, by U. A. Corti and the July issue to the Tenth Annual Report of the Swiss Bird Study Station Sempach. By A. Schifferli.

OBITUARIES.

CHARLES JOHN PENNOCK a member of the A. O. U. died on August 20, 1935, at his home in Kennett Square, Chester Co., Pa., where he was born on November 18, 1857, and where he had spent the greater part of his life. His parents were Samuel and Deborah Pennock, the former an inventor and manufacturer of agricultural machinery and president of the American Road Machine Co. of Kennett Square. For a few years the family lived at Ithaca, N. Y., to enable the three sons to attend Cornell University but later returned to Kennett where Charles entered his father's business. He later engaged in various other enterprises, the growing of carnations, the conduct of a lumber and coal business, and of a fiber manufacturing company, and finally established a real estate investment and insurance office. With it all he became active in local politics and served the borough as Chief Burgess and as Justice of the Peace. He was a member of the Society of Friends.

Through all his busy life his chief interest was ornithology. From boyhood he had collected eggs and birds and conducted a wide correspondence with kindred spirits in all parts of the country. Immediately after leaving Ithaca he occupied for a short time a position in the museum at Princeton where he made the acquaintance of W. E. D. Scott and soon after he became acquainted with B. Harry Warren of West Chester, Pa., then active in preparing his work on the 'Birds of Pennsylvania.' These were the first real ornithologists that he knew. In 1895 he joined the Delaware Valley Ornithological Club and immediately became a very active member of the little coterie which met at the Academy of Natural Sciences, including S. N. Rhoades, Spencer Trotter, W. L. Baily, Witmer Stone etc. Pennock was a regular attendant at the meetings and journeyed the thirty miles from Kennett Square even though it was early morning before his train brought him home. He was President of the Club, 1901-1903, and published a number of papers in its publication 'Cassinia.'

Other of his contributions will be found in 'The Auk,' the 'Wilson Bulletin,' 'Reports of the Delaware State Board of Agriculture,' etc., the earliest being his list of the 'Birds of Chester Co., Pa.' in the 'Report of the Pennsylvania Board of Agriculture' for 1886.

Living not far from the Delaware state line, and having acquired property in the state, he became intensely interested in its bird life, which up to this time had been almost entirely neglected, and made many collecting trips into the more remote regions. As a result of this interest he was appointed state ornithologist.

Pennock was elected an Associate of the A. O. U. in 1888 and became a Member in 1901 when that class was established.

At this time too, he had become interested in gathering together an ornithological library and by purchase and exchange endeavored to secure as many as possible of the works on North American birds listed in Coues's bibliography which was appended to his 'Birds of the Colorado Valley.'

In 1913 after attending a meeting of the Delaware Valley Club Pennock disappeared and for six years he was completely lost sight of. It appeared that suffering from a form of amnesia he had gone to St. Marks, Florida, where under the name of John Williams, he managed the business of a local fisheries firm and later became County Commissioner, Notary Public, etc. His interest in birds however, could not be suppressed and he began to publish notes in various ornithological journals and to supply data for the Biological Survey under the name which he had assumed. Under this name too, he was again elected an Associate of the Union! Certain char-

acteristics of his papers as well as his handwriting eventually led the present writer to identify him and he returned home.

Previous to this experience he had spent some time at Thomasville, Ga., and at Pinehurst, N. C., and now he and his wife spent part of several winters at Punta Gorda, Florida, where he did considerable collecting for several museums. Finding the long journey to Philadelphia too much of a strain Pennock transferred his interests from the Delaware Valley Club to the West Chester Bird Club in which he became an active member until failing health compelled him to remain at home. His collections of birds and eggs were presented to the Academy of Natural Sciences of Philadelphia.

Only those who were associated with Pennock in the field or in the study of his collections can realize the tireless energy of the man and the extent of his knowledge or appreciate the pleasure of association with him in his ornithological pursuits.

Pennock was twice married and the present Mrs. Pennock, and three children, two sons and a daughter, survive him, another daughter died some years ago.—W. S.

JOHN HOOPER BOWLES, a Member of the American Ornithologists' Union, died suddenly at Tacoma, Wash., February 2, 1934, at the age of 59. He was born in Boston, Mass., March 15, 1875, and during his early years enjoyed the acquaintance of William Brewster, E. A. Capen, and C. J. Maynard, under whose guidance he undoubtedly profited in his study of birds.

In 1896 his parents moved to Tacoma, where for nearly 40 years, with the exception of a sojourn at Santa Barbara, Calif., in 1909-1912, he assiduously prosecuted his studies until he came to be regarded as an authority on the birds of the Northwest. His collection of nests and eggs, comprising about 970 North American species and subspecies, was built up with the greatest care, and particular attention was given to the important matter of identification, no set being admitted concerning which there was the slightest doubt of authenticity. This collection is now in the Ferry Museum at Tacoma.

Bowles was elected an Associate of the American Ornithologists' Union in 1891 and in 1910 was made a Member. He was also a member of the Cooper Ornithological Club, the Caurinus Club, and the Pacific Northwest Bird and Mammal Society. In the last organization he served as vice president for fourteen years and became Associate Editor of 'The Murrelet.'

In later years he devoted his attention to collecting birds and concentrated his energies chiefly on nests and eggs. Probably no field ornithologist in the Northwest had a more intimate knowledge of this subject than did J. Hooper Bowles. Fortunately he had the happy faculty not only of sharing his experiences with friends but of recording them for others so that the results of his careful and systematic field studies of birds and eggs are now generally available. His first note on the 'Nesting of the Whip-poor-will' at Ponkapog, Mass., appeared in the 'Ornithologist and Oologist' when he was 16 years of age, and from that time on he contributed regularly to certain ornithological journals, chiefly 'The Auk,' 'Condor,' 'Nidologist,' 'Osprey' and 'Murrelet.' He was co-author with William Leon Dawson of the 'Birds of Washington,' published in two volumes in 1909. This was undoubtedly his most important work and one in which many of his early observations may be found. A useful bibliography of his publications numbering 142 titles, prepared by F. S. Hall, appeared in 'The Murrelet' for May, 1934, pp. 35-43. According to this list, a little more than 10 per cent of his articles, including several of his longer contributions, were published in 'The Auk.' In the same number of 'The Murrelet' may be

found a portrait and biographical sketch by E. A. Kitchin, which contains many interesting details regarding his activities and his work in the field.—T. S. P.

FRANK HARRIS HITCHCOCK, an Associate of the American Ornithologists' Union, and a life-long student of our birds, died in Tucson, Arizona, August 5, 1935. He was born in Amherst, Ohio, October 5, 1867. His father was Henry Chapman Hitchcock; his mother's maiden name was Mary Laurette Harris.

Hitchcock was fortunate in his birth and in his home life, for both of his parents were possessed of exceptional character, refinement and education. His father was a clergyman, but was also deeply interested in civic and social enterprises.

The family lived for a time in Wisconsin, but removed in 1880 to Somerville, Massachusetts, and here he finished his grammar and high school courses. He was graduated from Harvard University in June, 1891. Though mainly notable as a student, he was also a good athlete, being especially proficient in baseball, football and boxing.

I first met Hitchcock in early September, 1891, through a cousin who had attended school with him many years in Somerville. We had a bird-hunt or two together in the woods in Wilmington, but further association at that time was prevented by his appointment to a position in Washington, D. C., in November of that year. He had not been long in Washington when he called at the offices of the Division of Ornithology and Mammalogy at the Department of Agriculture, and soon joined the staff under C. Hart Merriam. The next spring, Hitchcock's brief acquaintance with me led to my own appointment in the Bureau where so many years have been spent.

Hitchcock's genius for organization was early reflected in his official work. As an example, he was the prime mover in retiring the cumbersome system of giving the skull of a mammal specimen a number different from that of the skin. It is impossible to estimate the saving in time and the gains in accuracy that have resulted since mammal skull No. 50,000 could be instantly recognized as the one that belonged to the skin of the same number. Had he accomplished nothing else while in the Survey, this reform alone would have paid many times over for his services.

However, Hitchcock's ambition to study law led to his determination to relinquish natural history as a life work, and he was soon transferred to the Division of Statistics in the same Department. He served here in various capacities until 1903. In the meantime he had pursued his law studies, had received the degrees of L.L.B. (1894), and L.L.M. (1895) and had been admitted to the District of Columbia bar in 1894, and the United States Supreme Court in 1897. His services in the Department of Commerce and Labor and as Post Master General, 1909-1913, as well as on important Government Commissions, and as manager of several presidential campaigns, are matters of public record that need not be detailed here. He practiced law in New York for several years following his Government service, and at the time of his death had resided for several years in the Southwest, where he was interested in several enterprises including at least two important newspapers.

During his college days, and his first year in Washington, Hitchcock was a keen bird student. His early life in Cambridge gave him the rich opportunity of association with William Brewster and other famous ornithologists and, as was habitual with him, he made good use of the experience. He published a few papers in 'The Auk' between 1889 and 1892, but as far as I know published nothing on birds during the later years of his life, although he always retained his interest in outdoor pursuits.

Hitchcock never married. His parents died many years ago, and his only known

surviving close relatives are two sisters. His remains were interred in Mount Auburn Cemetery, Cambridge, Mass.—EDWARD A. PREBLE.

WALTER ADAMS JOHNSON, an Associate of the Union from 1895 to 1915, a resident of Pleasantville, N. Y. for the past twenty-five years, died suddenly of a heart attack on June 29, 1935, at Chestertown, Md., while on a visit to friends. He was born at Galesburg, Illinois, on September 2, 1878; attended Lombard College at Galesburg and later did graduate work at Columbia University. He came to New York to be secretary to F. N. Doubleday of the firm of Doubleday, Page and Co., but he had already established a reputation as a publisher and editor having founded the ornithological journal, 'The Osprey,' while still at Galesburg, in September 1896, continuing it for two years when it passed into the hands of Dr. Theodore Gill and Dr. Elliot Coues, the latter having been associated with Johnson, during the second year. By the extensive use of half-tone illustrations and excellent taste in the details of printing and the selection of articles, Johnson set a new mark in the quality of popular ornithological journals and paved the way for 'Bird Lore,' 'The Condor,' and many others, though only a few have reached his standard of excellence.

While connected with the Doubleday firm Johnson started their well known 'Travel' and 'Garden' Magazines. Then branching out for himself he became American representative of the John Lane Company, publishers of 'Studio' which he developed into 'International Studio.' After this he founded 'Arts and Decorations,' the leading journal in its field today. Then he acquired 'The Field Illustrated' which he converted into a country gentleman's magazine and later began 'The Agricultural Digest' which was printed in English, Spanish and Portuguese and had a large circulation in South America. He was responsible for building up 'American Forests' and in 1931 launched 'Garden Digest' for which he is perhaps best known today.

He was a great lover of natural history and the outdoors and for years his hobby had been landscape gardening and the beautification of small home grounds. He is survived by his wife, the former Dorothy Biddle of Philadelphia, a son and two daughters.—CHIEFLY FROM 'THE TOWNSMAN' *Pleasantville, N. Y.*

JOHN KERN STRECKER, an Associate of the American Ornithologists' Union, elected in 1925, died at the age of 57, at Waco, Texas, Jan. 9, 1933. He was the son of John Kern and Felicia (Agnew) Strecker and was born at Waterloo, Ill., July 10, 1875. His education was acquired in public schools and in 1925 he received the honorary degree of B.S. from Baylor University, Waco, Texas.

His interest in natural history evidently began in early life. For many years he carried on active field work in Texas and visited many parts of the state in quest of specimens for the museum of Baylor University of which he was curator for 30 years. He also served as head librarian of the University from 1919 until his death. He was active in local politics and in fraternal circles and from 1911 to 1930 was head of the poultry department of the Texas Cotton Palace Exposition. His affiliation with scientific societies included, in addition to the A. O. U., the American Association for the Advancement of Science, the American Society of Mammalogists, the American Society of Ichthyologists and Herpetologists, the Biological Society of Washington, the Scientific Society of San Antonio, Texas, and the Texas Academy of Science. He served as president of the Academy and also of the Texas Folk Lore Society and the Texas Fish and Game Protective Association.

Strecker was particularly interested in herpetology and was an authority on the

reptiles and batrachians of Texas. He published numerous papers not only on the reptiles but also on the mammals, birds, insects and mollusks of the state. He emphasized the importance of collecting specimens and especially of recording observations made in the field. In a paper on 'Moths from the vicinity of Waco, Texas,' he says: "Hundreds of persons engaged in natural history pursuits have left nothing in the way of records or written observations for the benefit of posterity. Unless collections formed by such persons are, at their deaths, either bequeathed or sold to public institutions where provision is made for the further preservation of such objects, the life work of these men has also been in vain."

Strecker's publications on natural history number more than 100 titles, of which about 60 were devoted to reptiles and 23 to birds. His most important paper in 'The Auk,' 'On the Use by Birds of Snakes' Sloughs as Nesting Material,' appeared in 1926. This subject was further elaborated in a paper on 'Birds and Snake Skins' published a year later as No. 11 of 'Contributions from Baylor University Museum.' Recently his unpublished manuscripts have been collected and edited by his successor Walter J. Williams, now Curator of the Baylor University Museum, and issued as a Baylor Bulletin under the title 'Notes on the Zoology of Texas.' This excellent publication contains a portrait of John K. Strecker and 19 brief articles, including his personal 'Reminiscences of a Field Naturalist' and a bibliography of his scientific papers.—T. S. P.

DAVID GALBRAITH BAIRD an Associate of the Union died at his home in Beverly, New Jersey, on July 24, 1935, in his eighty-third year, having been stricken with heart disease some weeks before. Mr. Baird was born at Hopewell, Cecil Co., Maryland, on July 19, 1853, the son of Joseph and Jane Braden Baird and spent part of his boyhood in western Illinois coming later to Philadelphia where his education was completed. At the age of twenty he became a clerk in the office of the Lehigh Valley Railroad Company in that city where he remained for the rest of his life, being elected Secretary about 1900 and later assuming the duties of Treasurer as well. He served under every president of the Company and was better informed on the details of the railroad than any one else. Some years ago at the request of the directors he published a history of the Road. So faithful and conscientious was he that he went regularly to his office up until a few weeks of his death.

He was much interested in the history of both Maryland and New Jersey; was a member of the standing Committee of the Trenton Diocese of the Protestant Episcopal Church and a vestryman of St. Mary's Church of Burlington, N. J., as well as a member of the Masonic Order.

His hobby for the past twenty-five years was field ornithology and he became thoroughly familiar with the birds of his state both about Beverly and at Cape May where he had a summer home. He took great delight in compiling lists of the species seen on every walk, and on later trips to Florida and other points the unfamiliar birds were a source of great pleasure to him. He joined the Delaware Valley Ornithological Club in 1913 and was a regular attendant at the meetings contributing many observations of interest. He became an Associate of the A. O. U. in 1924 and attended the meetings in New York and Philadelphia as well as that at Salem, Mass. Cape May was his great delight and he took every opportunity to cover the beaches and salt meadows in search of rarities and to check the arrival of the migrants. He was a delightful companion on the many walks that the writer took in his company during the summer months at the shore.

His wife with two sons and two daughters survive him.—W. S.

CHARLES WILLIAM HENRY ELLIS, an Associate of the American Ornithologists' Union since 1927, died suddenly, on June 11, 1935, at his home in Washington, D. C., at the age of 84. He was born in Boston, Mass., February 8, 1851, the son of John Sardine and Lucinda Ann (Teale) Ellis and spent his early years in that city. For some time he was connected with the Waltham Watch Company at Waltham, Mass., where he gained skill and precision in handling delicate instruments which played an important part in his later work. About 1886 he took up his residence in Washington, D. C., where he served for some years in the U. S. Fish Commission and afterwards was associated with Prof. A. Graham Bell in his laboratory there and at Baddeck, Nova Scotia. During his later years he was associated with the Geophysical Laboratory of the Carnegie Institution from its organization until his retirement in 1926.

From early youth Mr. Ellis was deeply interested in natural History particularly in birds and was familiar with many of the commoner species. He was a regular attendant at the annual meetings of the Union where, as the father of Mrs. T. S. Palmer, he was known to a large number of the members. At an age when many lose their interest in the affairs of the Union he was active in assisting the Secretary in preparations for the meetings and in compiling information concerning the membership. For several years he spent his summer vacation with Dr. and Mrs. Palmer at Cape May, N. J., and those who had the privilege of being with him could not but be impressed with his keen interest in everything he saw. The ocean, the bird life of the shore and the marshes, the historical buildings and their associations all aroused his enthusiasm and made his companionship a delight to all who shared it.—W. S.

GEORGE DUPONT PRATT, an Associate of the American Ornithologists' Union since 1917, died at his home in Glen Cove, Long Island, N. Y., January 20, 1935, at the age of 65. He was the son of Charles and Mary Helen (Richardson) Pratt and was born in Brooklyn, N. Y., August 16, 1869. After graduating from Amherst College in 1893 he was connected with the Long Island Railroad for several years, serving as shop hand and later as assistant to the president and superintendent of ferries. Notwithstanding varied business interests and many exacting demands on his energy he always found time for civic and public activities. As an early member of the Camp Fire Club he became interested in conservation and for 25 years served on its committee on conservation. His outstanding contribution to public service was his term as Conservation Commissioner of New York from 1915 to 1921, when he instituted many important reforms and gained the reputation of being the best Conservation Commissioner New York ever had. As a trustee of Amherst College, the American Museum of Natural History, the Metropolitan Museum, as vice president of Pratt Institute, and as president of the American Forestry Association, he performed notable service. He was particularly interested in forestry, conservation, art, and museum work and in later years withdrew from active business in order to devote more time to conservation.

George D. Pratt was 'preeminently a lover of nature's out-of-doors' and was referred to as a 'man of the trees' on account of his devotion to forestry. Quiet, unassuming, persistent and energetic, he was successful in achievement, and, possessed of ample means, was a patron of conservation, art, and science in the broadest and best sense.—T. S. P.

WILLIAM HENRY FOX, one of the Associates elected at the first meeting of the American Ornithologists' Union in 1883, died at Washington, D. C., November 3,

1921, and was buried at Nashville, Tenn. Although associated with the Union for 38 years, no notice of his activities has thus far appeared in 'The Auk.'

He was the son of John L. Fox, Surgeon U. S. N., and Elizabeth Amory Morris Fox, and was born in Washington, D. C., Nov. 18, 1857. Had he lived a fortnight longer he would have reached the age of 64. His early education was received at St. Mark's School, at Southboro, Mass., and later he attended Sheffield Scientific School at Yale. He received the degree of M.D. in 1884 at Columbian, now George Washington University, Washington, D. C., and later spent two years at the New York Post Graduate School and at the Manhattan Eye and Ear Hospital. He was an eye specialist and was in active practice in Washington for many years, where he was one of the founders of the Episcopal Eye, Ear and Throat Hospital and from 1907 to 1920 its executive officer.

Dr. Fox was deeply interested in natural history and particularly in ornithology and entomology. While still in New Haven he was elected president of the Yale Society of Natural History. His collection of birds passed into the hands of Dr. Jonathan Dwight and is now in the American Museum of Natural History in New York, and his collection of spiders was acquired by Cornell University, Ithaca, N. Y. In the decade from 1878 to 1887, during his college days, he contributed several notes to the 'Bulletin of the Nuttall Ornithological Club' and 'The Auk,' chiefly on birds observed on his summer trips to New Hampshire and Tennessee. His principal ornithological contribution, a 'List of Birds found in Roane County, Tennessee,' appeared in 'The Auk' for 1886. This paper included notes on 114 species observed during the spring in 1884 and 1885, and the specimens collected on these trips were deposited in the U. S. National Museum.—T. S. P.

NOTES AND NEWS.

THE LOCAL COMMITTEE for the fifty-third stated meeting of the American Ornithologists' Union, at Toronto wishes it to be understood that titles of all papers must be in the hands of the Secretary, Dr. T. S. Palmer, 1939 Biltmore St. N. W., Washington, D. C., not later than October fourteenth. The Local Committee has to deal with equipment for moving pictures, the Provincial censor of titles, the customs, and finally the printing of the programs; and will not accept responsibility for titles sent in at a later date.

WE ARE pleased to announce the early publication by the American Museum of Natural History of Dr. Robert Cushman Murphy's book on the 'Oceanic Birds of South America,' based in large part upon the famous Brewster-Sanford Expedition of 1912-1917. It is to be a two-volume work sumptuously illustrated by photographs, upwards of fifty maps, numerous other text-figures, and sixteen color plates of birds from the brush of Mr. Francis L. Jaques.

The area to which the study is devoted includes the coast of South America and all the surrounding islands which form links in the chain of distribution of southern-hemisphere sea birds. Part I comprises a narrative of American Museum field work, a discussion of the oceanic life zones and their respective avifaunas, and a regional geography covering the entire South American shore line and the associated islands of the Caribbean, the Atlantic and Pacific oceans and the American section of Antarctica. Part II is devoted to biographies of about one hundred and seventy forms of oceanic birds.

M. J. DELACOUR, Secretary of the Ninth International Ornithological Congress, informs us that the date and place for this Congress has been set to come between the 1st and 15th of May, 1938, at Rouen, France.

MR. H. W. ROBINSON writes us from Lancaster, England, "I was interested to read Messrs. Noble and Vogt's article on birds copulating with mounted specimens, for over thirty years ago my mention of the fact in the press was ridiculed as a 'traveler's yarn.' I mentioned that when shooting Wood Pigeons (*Columba p. palumbus*) and Curlews (*Numenius arquata arquata*) over stuffed decoys, mounted on stands both species respectively copulated with them, not merely isolated cases but often."

A COLLECTION of birds shot on the island is being displayed in the Jubilee Gallery of the Barbados Museum with request for additional specimens from local sportsmen. Among those already displayed are a Western Sandpiper (*Ereunetes mauri*) and a Ruff (*Philomachus pugnax*) neither of which we think has been previously put on record.

NEW ZEALAND papers have been publishing an account by Mr. J. Drummond of the notable collection of New Zealand birds' eggs formed by Mr. Edgar F. Stead representing 140 species not only of birds native to the islands but also sets of species that are only winter visitants which have been obtained from correspondents far to the north.

DR. JAMES P. CHAPIN of the American Museum of Natural History was awarded the Elliot Medal of the National Academy of Sciences in recognition of his work on the Birds of the Belgian Congo.

MR. E. A. PREBLE, veteran naturalist of the U. S. Biological Survey, was retired on June 30, 1935, after forty-three years of service, beginning on April 1, 1892 when in his twenty-first year. Mr. Preble is well known for his explorations in the Athabaska Region, British Columbia, etc., and as an authority on various groups of North American mammals, and also as former editor-in-chief of the *Journal of Mammalogy*. He is an all round naturalist and his wide knowledge of wild life has for years been of the greatest service to the Government.

THE DUTCH and French Governments have officially recognized the International Office for the Protection of Nature and have appointed delegates for the mother countries and for the Dutch East Indies and the French Colonies.

MR. J. E. STILLWELL of Dallas, Texas, is continuing his excellent publicity work in behalf of Quail and of Hawks and has secured publication of educational articles in a number of the newspapers of the state.

W. L. MCATEE has prepared for the Biological Survey a mimeographed popular account of the birds and other wild life of the Atlantic Coast marshes for the benefit of the CCC camps with descriptions sufficient for their identification and statements as to their economic status. This will go far to make the young men in these camps realize the value of conservation but the very nature of the work that they are ordered to do is often directly opposed to the preservation of wild life and it is unfortunate that those who direct the work cannot be made to see the evil that often results from their draining and other activities.

THE NATIONAL ASSOCIATION of Audubon Societies has recently established the Witmer Stone Wild Life Sanctuary, at Cape May Point, N. J., where the shooting of Hawks has been carried on for many years. A warden has been placed in charge and no shooting will be permitted in the sanctuary, while every effort is being made to restrict the shooting to the unprotected species in the adjoining area.

Through the generosity of Doctors Millicent Todd Bingham and James M. Todd, the Society has been enabled to establish the Todd Wild Life Sanctuary on an island in Muscongus Bay, on the Maine coast.

THERE HAS been purchased recently by the William Henry Smith Library, the four volume set of the elephant folio of Audubon's 'Birds of America' and the 'Ornithological Biography.' They are housed in the new Indiana State Library and Historical Building at Indianapolis. This set is one of those containing the ten plates of Lizards unretouched by Havell. It was formerly owned by the late Wm. W. Borden of Borden, Indiana.—S. E. PERKINS, III.

THE DUCK controversy has been waging all year; conservationists have pled for a one year's closed season; arms and ammunition manufacturers are opposed; sportsmen's organizations seem to be about equally divided. Many circulars and pamphlets have been published and direct appeals made to the Secretary of Agriculture.

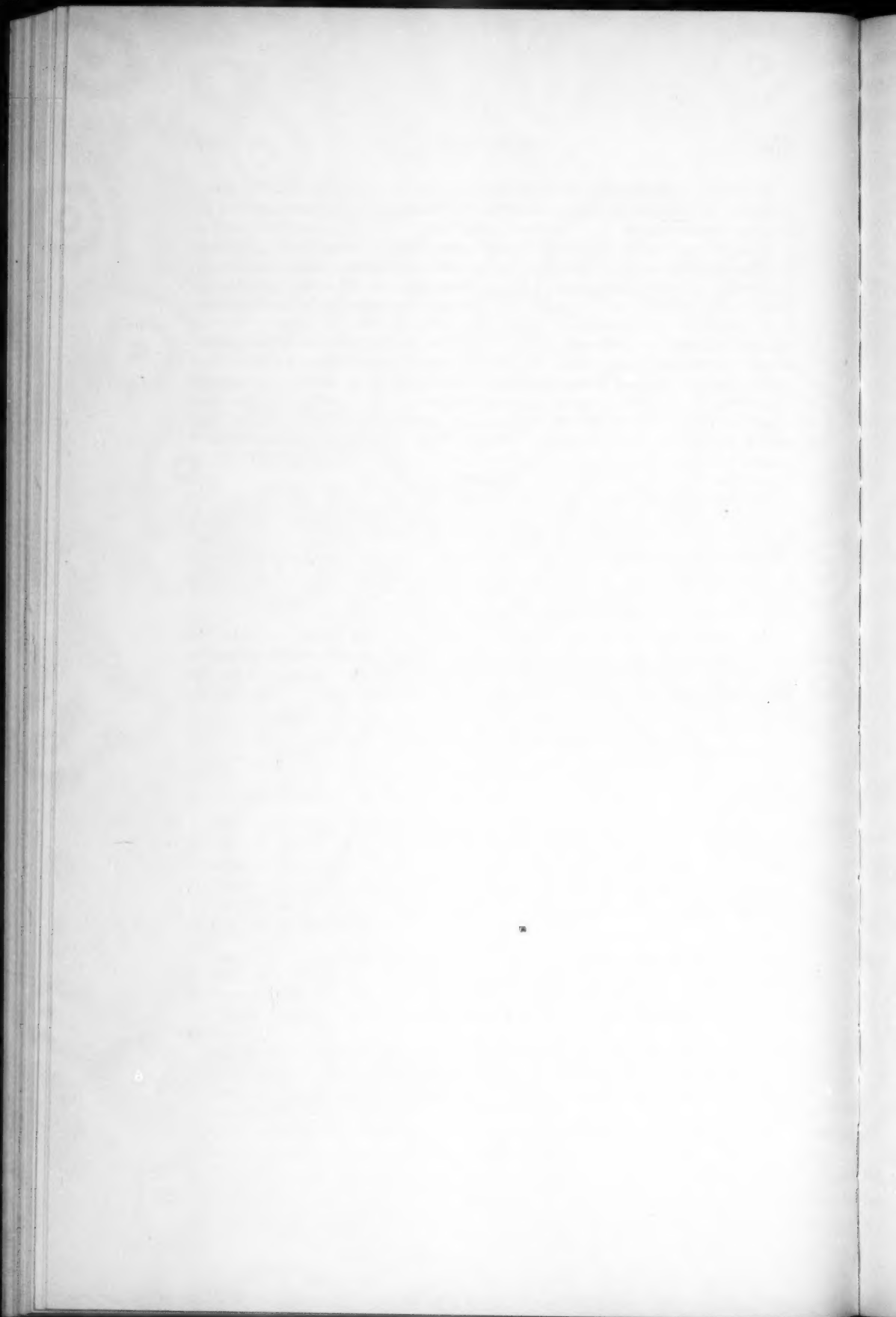
On July 30 the President of the United States issued a proclamation "recommended by the Biological Survey and adopted by R. G. Tugwell, the acting Secretary of Agriculture" allowing an open season of 30 days in each of the two zones into which the country is divided—Oct. 21–Nov. 19 in the north (to Long Island, Pennsylvania, Illinois, etc.) and Nov. 20–Dec. 19 in the south (New Jersey to Kentucky and Oklahoma, southward). This settles the matter for 1935.

The Survey in announcing the open season stresses the elimination of sink boxes, batteries, baiting and live decoys, the further reduction of certain bag limits and the limiting of repeating shot guns to three shells.

All this helps; but will it save the Ducks? The National Association of Audubon Societies calls attention to the fact that the shooting season begins in Alberta, Canada, on September 1 and closes in Louisiana on December 19, so that even though there are but 30 shooting days in any one spot, the migrating Ducks face a barrage of 110 days on their southward flight! Mr. John H. Baker, Executive Director says further (and we fully agree), that Chief Darling of the Survey has striven earnestly to arrive at the recommendation he deems best. "We are sore at heart that he has felt impelled to advocate an open season this year but let us give credit where credit is due and hail his courage and wisdom in recommending the permanent outlawing of baiting, live decoys, batteries and sink boxes." The Audubon Association also quotes Chief Darling to the effect that there are at present 18 to 20 million Ducks in the country and as 600,000 Duck stamps were sold last year, it figures that there are left only about 40 Ducks per gunner!

The Biological Survey Bulletin announcing the open season says, "there will be violent protests from those who believe the season should be closed and equally loud complaints from those shooters who believe the Survey is being over cautious." The Survey does not regard the open season and the prohibitions already referred to as a compromise but as "progress toward restoration without breaking down existing State and Federal law-enforcement organizations by the imposition of an impossible load." In other words it apparently fears that the enforcement of an absolutely closed season would be impossible without many additional wardens, whereas the loss of license fees upon which enforcement now depends, would greatly reduce the warden forces and result in a vast increase in illegal gunning. Probably no one can accurately weigh the arguments advanced by the two sides; no one can realize the pressure brought to bear nor the part that politics has played in the matter.

The die is cast and by this time next year we shall probably know, in a measure at least, who was right.



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DATES OF ISSUE.

- Vol. LI, No. 4—October 6, 1934.
 Vol. LII, No. 1—January 8, 1935.
 Vol. LII, No. 2—April 13, 1935.
 Vol. LII, No. 3—July 2, 1935.

THE AUK

A Quarterly Journal of Ornithology

ORGAN OF THE AMERICAN ORNITHOLOGISTS' UNION

Edited by Dr. Witmer Stone

ACADEMY OF NATURAL SCIENCES, LOGAN SQUARE

PHILADELPHIA, PA.

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THE OFFICE OF PUBLICATION

8 WEST KING STREET, LANCASTER, PA.

Subscriptions may also be sent to W. L. McAtee, Business Manager, 3200 22d Street N., Cherrydale, Va. Foreign Subscribers may secure 'The Auk' through H. F. and G. Witherby, 326 High Holborn, London, W. C.

Subscription, \$4.00 a year. Single numbers, one dollar.

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